TELEPHONE ENGINEER

VOLUME XXV JULY, 1921 NUMBER 1

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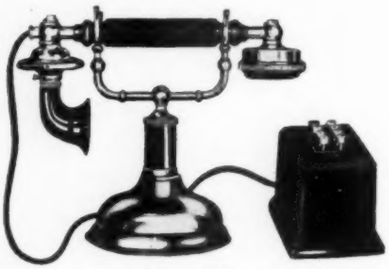

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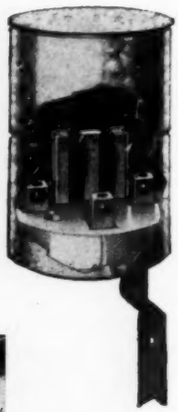

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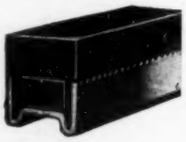

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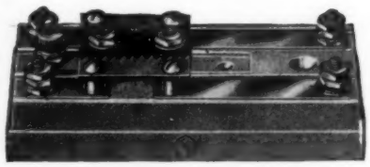

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VOL. XXIV JULY, 1921 NUMBER 1

"Good Will" Begins At Home

Successful Southwestern Official Says It's Vital to Have Your Own Force "Sold" on the Company Ere Hope of the Public's Favor May Be Solidly Founded

By J. E. Farnsworth
(Vice President Southwestern Bell Telephone Company)
Before Arkansas Public Utilities Association

That the best possible relations should be sought with the public by utility corporations, has come to be realized of late much more than in former years. Up to the last decade little, if any, attention had been given to cultivating the public—in fact, outside of the admonition made to employes that "Unfailing courtesy at all times must be shown our patrons"—this coupled with the statement, "Courtesy costs nothing and yields excellent returns," scarcely any attention was given to that which is now recognized as one of the vital factors in the utility business. Thus, based upon a fundamental which in part was absolutely a fallacy, was the only effort put forth—for I maintain courtesy does cost something. The employe who is courteous cost someone hours of patience and zeal in inculcating that courtesy—oft-times under most trying conditions, exerts a restraint upon himself that requires much in the way of effort, and the utility pays for this courtesy in an increased salary, for the polite employe, all things else being equal, eventually draws a higher salary than his fellow who is deficient in this respect.

In the beginning the utility field was invaded by many small companies and was largely handled as a speculative rather than a business venture, but as the business became more standardized, the necessity for the various utilities being appreciated the more by the public, and finally the wastefulness of competition being understood, the day came when many mergers were brought about and at this time it is generally recognized that the utility field should not be occupied by but the one company in its particular line—with the doing away of this acute competition, came the thought of the public, however, "Now that we are subjected to a monopoly we can expect nothing else except the most arbitrary treatment, one feature of which

J. E. Farnsworth

will be an everbearing demeanor and the utter lack of courtesy." This natural conclusion of the public was driven into the minds of utility men until today every one in the utility business who exercises any thought whatsoever as to its necessities, realizes that good public relations are absolutely essential to our prosperity and the methods that shall be employed and the efforts that shall be put forth are coming to have the most carefu lthought and are rapidly being standardized. The methods and efforts already under way were to an extent cast aside during the world war and even up to the present time conditions have been such, owing to readjustment factors, that all has not been done which it is hoped and expected will be accomplished in the near future. The attaining and maintena ce of good public relations are to be considered as an integral part of the business—just as important in a way as the erection and maintenance of a first class plant, the putting into effect of efficient traffic practices, and the doing of a first-class commercial job.

Looking for a Target.

Again, I think we all realize that now that the mind of the public is not under the intense strain it was during the years of the world war, and again that the readjustment of living costs is facing us and this along the lines that they are being reduced, the thought of the public is turning towards public utilities, demands upon them are much greater, and the spirit of criticism is the more rampant. Added to this is the fact that our property, occupying the streets of the cities and the highways throughout the country is continually in the eyes of the public—constantly called to their attention, and it is to be remembered that these streets and public roads are occupied by the consent of the public, and the public looks upon us as living by its permission and consent, and the public mind is embedded in the thought that we are but its agents

and servants. In fact, our very existence depends upon the public and we are being constantly focused in its eyes, we must obtain and maintain the good will of the people if we are to exist and prosper.

In the study that is now being made as to methods and the efforts that are to be put forth in order to bring about the desired results, I think most of us have come to believe in these things which I shall now touch upon, although some of them are advanced upon my own reponsibility with the idea of, possibly, bringing forth thought and discussion which may lead to even a greater degree of efficiency.

"Never do anything for nothing," the motto of years ago, should be thrown into the discard and in its place we should substitute the theory, "Do all reasonable things that can be done for nothing," "nothing" meaning no financial return at the time. We have come to this I think from the fact that we recognize that utilities should be humanized—that one of the most popular charges against public utilities is that they are not human—only machines and having nothing of the milk of human kindness in them. the utilities, we seek to •noculate just that which the parent inculcates in the child—"As you live your life, always do a kindly act, lend a helping hand, speak an encouraging word whenever you can, try to be helpful in a spirit of generosity, and not ask a return—the return will come many times when you least expect it and in any event you will be held in esteem by all those with whom you are brought into contact and the award will surely be yours," and just so will the reward certainly come to the utilities if they are thoughtful, kindly, courteous, helpful. In fact, just as they humanize themselves and seek to to reach the plane of the best there is in humanity, just to that extent will the reward come to them. I must not be understood as advocating that utilities should see to it that revenue is obtained in every reasonable way for service rendered, but I do say that beyond this, there are many, many little things coming under the head "Doing something for nothing" that should be done.

At the outset, I think we agree the utility endeavoring to bring about proper public relations should deem as a most necessity factor that the entire force be impressed by all means within reason of the necessity of such relations. It will avail little if but a few become experts 'hrough intensive study, and their knowledge is not passed along through the various grades until those in the rank and file are impressed with the value of the work, understand the methods, and become enthusiastic in carrying them out.

"Relations" a 100 Percent Duty.

We should see to educating our force in all departments just as we have educated the commercial employes in commercial practices, the plant people as to their duties and the traffic force as to the most efficacious means is handling the business offered us. We have been exceedingly diligent and energetic in instructing all ou remployes as to operating practices; public relations is in a sense not an operating problem, but from this time on, I think we will look upon it as such.

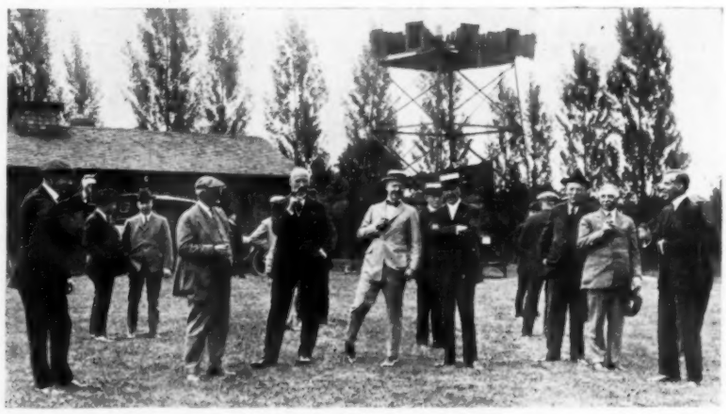
Again, we should, as I think give careful attention to this thought, which opens up a fiedl that can be exploited to wonderful advantage.

Let us take our employes into our confidence. Let us tell them about our business, that they may be interested.

It is not possible to believe that any one can become very enthusiastic as to his employment if her knows practically nothing about the business of the concern he is working for. A public utility employe knowing nothing of the affairs of his corporation—that which it is attempting to do, the success or failure of its efforts, the basis upon which it is run, the difficulties that it is called upon to overcome, must necessarily have but little interest in it. Of course, the larger the utility and the greater tha number of employes, the more difficult it is to tell them a great deal about all these things and large number of the employes, themselves would not grasp man ythings, if told them but there are many, many features of the business, many, many happenings that could, from time to time, be told that would awaken their interest. As an example of this, I remember sometime back I addressed the Telephone Society of Dallas—the subject matter was "Why did we have to double our rates—why such a tremendous increase at one time —why had not increases been made from time to time?" There was a long story, covering a period of nearly 25 years, and as I recounted this story to upwards of 200 employes ,those whom I was addressing, showed the most lively interest, if I am a judge as to whether or not an audience is interested, and an increased loyalty to the company was the result. Utility employes have many meetings these day and if good judgment is exercised, things pertaining to the company can be said to them in a way that they will feel they are not being taken advantage of and all this will assuredly cause them to be much more interested and enthusiastic in our behalf.

Education of the Public.

We have done much in the way of good work of late in this respect, but now that the greater opportunity is here, I feel that we all realize even better work can be done an dmust be done. I do know that the officials of my company are planning to take advantage of the great facility that we have at our disposal in bringing our patrons to our central offices that they may view our plant, inspect our switchboards, see our operators at work and know the commednable efforts that they are putting forth in the way of trying to give a good service—become acquainted with the wonderful machinery that is installed in order that a telephone service may be given, inspect all the apparatus that goes to make up a telephone central office, have something said to them as to the



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Like to know the song that is coming from Chicago to President Thayer's Farm at Naponach, N. Y., to the evident delight of the A. T. & T. executives gathered for the demonstration of the huge amplifier shown in the background. It's a handy thing for a farm dinner call.

extent of the cost and the wonders of the central office, the underground plant, the cables, and all that goes into a telephone exchange and even more than this—the splendid working conditions with which we surround our people, our rest rooms, hospital room, and be brought face to face with the supervisors, matrons and others of like grades; to see our methods, and in fact, be told all those things that we have already accomplished; be impressed with the fact that we are going to bring about even better and greater things. In fact, it is most thoroughly realized by those who are attempting to bring about the highest degree of public relations that as our patrons know all these things they become less critical, more friendly, and oftentimes our militant partisans. Perhaps, telephone companies are more fortunate than other utilities in having this wonderful facility at their command but I am impressed that all utilities have much that can be used to advantage along these lines.

Next, I would advance the thought that all our employes be made to realize that 'Favors and refusals are cumulative." It has been perhaps too frequently in the past the disposition when a favor is asked, to jump to the conclusion "We can't afford to do this." A favor, inconsequential in itself, may not be of importance, but one favor refused, added to another, is cumulative and finally, the time comes when this policy is carried too far. This accumulation of favors not granted means that the utility has no friends, is looked upon with hostility, and at last disaster; one little refusal, amounting to nothing in itself, added to another little refusal and so on into the hundreds at last will find the concern is looked upon as ill-mannered, ill-natured, inconsodireate, and worthy of a kick whenever a kick can be administered. You and I all know corporations that have gotten into just such a state through just such happenings and while it might be well again and not too many favors granted and to impress that a line must be drawn some refusals given, nevertheless, I do think we should be very careful in this respect.

Supervision of Employes Handling Complaints.

Many of our patrons in the city of Dallas insist upon coming to me with their complaints, as owing to my long residence in the city, many of them have come to know me personally. In order to save time, except where it appears necessary to go to the general manager, I take these complaints up directly with the repair clerk. My experience, I doubt not, is yours. If I come in contact with a repair clerk who answers me courteously I feel that he takes a personal interest in seeing that the complaint is corrected, this makes the best possible impression upon me. If I go up against a clerk who, while polite enough, yet by his voice indicates that he is simply doing a job and has no particular interest in it, I feel discouraged and have a doubt that the trouble is going to be corrected. Of course, no clerk is discourteous when talking to the president of the company, but such is not the case with the patron—if a clerk was discourteous with me I would immediately request of the general manager that he be investigated; but generally the patron does not complain of the clerk, and even if he does, the employee generally is not sufficiently investigated and this means that the patron is from that time on either unfriendly, or the bitter enemy of the company. Is it possible to imagine where more good or more harm can come to our business than the manner in which complaints are handled by our clerks.

To my knowledge utilities even up to the present time have not specialized in drilling their repair clerks—in teaching them that upon their shoulders rests perhaps more responsibility than even upon others, in keeping of our patrons friendly toward us. The patrons who complain is at the time displeased with us, sometimes moderately so, at other times very strenuously, and at others even viciously. His feelings can be overcome to a greater or less extent by the manner in which he is treated and oftentimes even the vicious patron can be turned into a friend—all that he wants under ordinary conditions is to absolutely feel that every possible effort will be put forth in the correction of the trouble tha he is experiencing. I am inclined to believe myself that telephones should be placed so that the manager may, from time to time, listen in and know just exactly the manner in which our repair clerks are handling our patrons, it being said at the time to the repair clerks that such an arrangement will not be for spying purposes, but for the purpose of helping them, that is if we found unconsciously that under their burdens their nerves were becoming frayed it was our purpose to arrange for a rest that they might come back to normal conditions.

More Care in Selection.

I think that in employing a repair clerk, even greater efforts should be put forth in selecting the proper person than are in effect as to the selection of our operators. In any one day an uncivil and grouchy repair clerk can do us more harm than an uncivil and grouchy operator—the operator handles people who are not at the time in a bad frame of mind, but the repair clerk is up against those who are not normal at the time—at least not normal toward us.

I might say just a few words as to our keeping before us at all times the importance of being in touch with newspaper men and others of importance in the community. To say very much as to this, however, would be trite, as I presume more thought has been given to this and more said about it than any other division of the matter upon which I am talking. However, it is only by eternal vigilence and exercise of continual energy that we can keep ourselves up to the proper standards. I do think there is one shading of this particular subject that we should harp upon re-

301134—Copyright Underwood and Underwood.
Four miles away a huge transmitter is repeating a message from Chicago, and over the valley the sound comes to the heads of the American Telephone and Telegraph divisions, assembled at President Harry B. Thayer's Yama Yama farms to hear this miracle of telephone science.

peatedly, at least the larger corporations, and that is "the responsible head of the company, in each locality, should realize he is held strictly responsible in seeing to it that some one connected with the city government is sufficiently friendly with us that we may at all times know anything that is being considered by the city authorities affecitng our interests, and furthermore, that anything initiated affecting us is not acted upon until we re heard. This is not asking too much of our people, nor again is it asking anything that is not strictly in the line of justice or loyalty on the part of the employee of the city—it is not seeking anything that they are not willing to grant, for when action is hastily taken against a corporation, it is because the members of the city government do not realize the importance of their action. If we can only have the opportunity to submit our case—we shall seldom be injured, but if, as sometimes happens, action is taken before we know anything about it, we are injured and we should blame ourselves that we did not know. That we should have the good will of the newspapers and the prominent people living in our community is of course known to us all. "Eternal vigilance" should be the watchword.

There is nothing that causes the general public to be more antagonistic to the utility more than a find that the employees are dissatisfied and disloyal and that they speak of it unkindly. It should be impressed upon the employee that it will be regarded as a most grevious error on his part, not to speak in favor of the company. If ever he is peeved or dissatisfied and does not feel kindly towards their employer, he at least can keep his mouth shut.

Keep Companies Out of Politics.

A public utility should never get mixed up in a political campaign. Of course at times it may be very essential to the welfare of a utility that certain men go into office and others be kept out, but I think that the only safe and sound method by which a utility can hope to have an influence in bringing about the desired result is for the utility to build up such relations between itself and its employees, and between itself and the general public, and a simple announcement of his position by the head of that utility in the town affected should accomplish all that can be expected. If our employees do not feel kindly enough towards us to follow us when they know our sentiments in political matters, vitally affecting our interests, they won't follow us anyway, and again if the public does not feel friendly they will go against us, if we go actively into a political campaign.

MANSFIELD'S AUTOMANUAL.

New System Inaugurated at Ohio Metropolis—Greeted by Record Business.

Mansfield, Ohio.—With a speedy connection that amazed both Mayor Brunner and Edwin G. Slough, secretary of the Mansfield Chamber of Commerce, the new Automanual service in Mansfield was inaugurated.

A normal Sunday's calls in Mansfield runs around 16,000. The Sunday upon which the cut-over was effected established a Sabbath record of 42,000, giving the equipment and its operators a severe test that was passed with high honors. LeRoy Wittemire, manager of the company and Gustav Hirsch, the prominent consulting engineer of Columbus, who was responsible for the engineering and installation work, pronounce the job a success from a technical viewpoint. Their satisfaction is shared by the Mansfield public, to judge by the many columns of commendatory publicity given the event.

The cut-over was made at 1 a. m. June 12, when the old common battery board was retired to a well earned rest and the new Automanual switchboard of North Electric manufacture cut into service. After the cut-over there were but ten permanent signals.

The old switchboard had done duty since 1901 and showed wear, especially in the jacks and keys.

The new equipment consists of a main frame of Cook Electric Manufacture No. 100 made and complete central office equipment of 3000 lines of Model B Automanual equipment, equipped for ten party ringing throughout with 20 percent trunking in eight party bays, 16 percent trunking in four party bays and 10 percent trunking in straight line bays.

In addition to the above there was a hundred line bay equipped for dial control service, a pay station section, two farmer line sections and the necessary controlling apparatus in addition to the twelve local desks of three key sets each, entire equipment being so arranged that the traffic of the entire exchange can be handled from any pay station, local, rural or supervising position.

In preparation for the cut-over the rear one-half of the company's building had been torn down and a modern concrete, fireproof structure erected separated from the front part of the old building by a fire wall, and all of the new equipment is housed to the rear of the fire wall in the new part of the building, the operating room being at present quartered in a portion of the switch room and separated therefrom by temporary partitions.

The toll equipment of the company is located in the building formerly occupied by the Bell Telephone company, also being temporary in its nature, awaiting the installation of a modern toll board in the front part of the old building when that has been rebuilt.

As it is at the present time, the new building houses the departments and the old front portion houses the commercial offices, traffic department, and the female employes' rest room.

"Zero Hour" for Trade Strafe," Says W. E. Head.

New York City.—"Germany today is in a position to undersell the world on most manufactured articles," says Chas. G. Du Bois, president of the Western Electric Co., who has just returned from six weeks of intensive data gathering in Europe. "Industrially, Germany seems to be as efficient as ever. As nearly as I can calculate it, the cost of German labor in the metal working trades, measured in dollars, which is the correct way to measure it when it enters into competition with the United States for foreign trade, is abort one-sixth of the cost of equivalent labor here. The danger in Germany is of a social overturn more than anything else. It is almost impossible," said he, "to think of Europe as a whole today. Each country is faced with different problems. In Austria the situation is serious but not immediately critical. The people are not getting enough to eat, but everyone is getting something. Conditions in Hungary are quite different. This country, largely agricultural, is able to support herself. She is breaking away from German influence and seeking favor with England. For the first time Hungary claims she has balanced her budget and does not want outside loans. She is preparing to build up from within. Czecho-Slovakia, among the central powers and Belgium among the allies, seem to be in the best condition."

Administration Creates Capital Female Famine.

Washington, D. C.—There must be a lot of wires being pulled in Washington today. Up to March 4, according to A. E. Berry, president of the Chesapeake and Potomac Telephone company, there were plenty of operators. Now a scarcity confronts the company. There was a marked increase in telephone calls with the advent of the new administration.

Loading Coil and Its Work

Loading Coil Design and Construction Subject Prominent Engineer Explains for Practical Employment—Design Formalae and Diagrams

By W. H. Furthman

Loading coils when used as inductance coils can be constructed with or without iron cores. Inductance coils which are made without iron cores are larger than those coils which are made with iron cores and this difference in size is so great that it would not be a commercial proposition to install them on poles for aerial circuits or in conduit vaults when loading underground telephone cables. One of the principal objections to inductance coils having cores is due to the introduction of internal losses of energy. This internal loss of energy increases very rapidly with the frequency and brings about a distortion of the transmitted and complex harmonic waves that accompany speech transmission in the telephone. These iron core losses can be diminished by a sufficiently high degree of lamination and a considerable decrease of the ampere turns of the winding. This can be readily accomplished either in the coils having cores which form either a closed magnetic circuit or in a coil having air gaps in the cores. It is true, however, that a core having a closed magnetic circuits gets a much stronger magnetization from a given number of ampere turns and therefore a much larger core loss. This difference between a closed magnetic core and the air gap core in a loading coil may be materially decreased so that the difference in the magnetization is very small as compared to the desirable factor of producing a coil, the core of which cannot become magnetized. In order to reduce, for a given inductance, the core loss to a predetermined limit, it is necessary to employ a very fine subdivision in the iron core and to use a smaller number of turns.

Design Considerations.

Loading coil suitable for loading conductor should be given an inductance as small as possible. This desirable reduction in size is attained primarily by placing two windings, one for the outgoing and the other for the return wire of the circuit on the same core. In this manner the inductance of each winding is increased by the mutual inductance with the other winding. The core loss of energy per unit of inductance in compact coils of this type is generally large and it is therefore necessary to reduce this loss to an economical minimum. In a telephone cable loading coils have a tendency to increase the cross talk and the symmetrical distribution with respect to both sides of a conductor is of paramount importance. When the windings

W. N. Furthman.

of two sides of the above circuit are placed on the same iron cores they must therefore be equal and in the same relation to the core. This equality consisting of the same inductance and resistance, the capacity of such a coil can be readily made very small since the thickness of the insulation can be made sufficient to insure this condition without making the size of the coil too large or bringing up the cost of this construction beyond commercial limits. In order to overcome any mutual inductance between the inductance coils of different circuits when they are assembled on the same spindle, such as loading a telephone cable, the coils are wound so that the winding is distributed over the entire core without producing an appreciable external magnetic field. Such a distribution of the winding is obtained in the most convenient solenoidal form when wound over a torroidal iron core.

In considering the manufacture of loading coils with iron cores it must be borne in mind that for all frequencies which are of importance in the telephone, the resistance of a coil corresponding to a given inductance can be made considerably smaller than in one having no iron core. It is also more commercial to construct a practical form of coil possessing no external induction when an iron core is used than without, provided a uniform and symmetrical design is thoroughly carried out.

Calculating Energy Loss.

It has been found in coils of such construction that the energy losses due to eddy currents in the winding can be made much smaller than those in the iron core. These iron core losses of energy are called hysteresis losses. The method of calculating these losses has been proven in varying magnetic fields, such as dynamos, motors and transformers. In working out such formulae certain experimental data for each apparatus must be previously prepared. Such formulae refer to apparatus working with high magnetizations such as are usually employed in the ordinary commercial work. They have no application to the construction of loading coils because of the extremely small magnetization which is found in their operation. In this connection it may be stated that the construction of iron cores for inductance coils takes into account not the absolute value of the iron core loss of energy, but the exact increase in resistance of the coil winding bought about by this loss.

Since the increase in efficiency of transmission resulting from the use of loading coil depends on the amount of resistance introduced per unit of inductance by the inserted inductance coil, it is evident that the increase of resistance due to iron core losses is a very important quantity. Since there is no basis whatever in the present state of the art for exact calculations relating to this point, this question cannot be answered perfectly, not even in the case of so simple a construction of a coil as has been outlined. It can be stated, however, from experiments which have

been proven and in practice, that the increase in resistance due to iron core losses will be held to a minimum per unit of inductance for telephone frequencies when soft iron wire is used which has a permeability equal to 65. Transmission of voice frequencies through such coils will be distortionless, which is of decided importance when such a condition is obtained within reasonable economic costs.

It is a well-known fact in telephony particularly and to a certain extent in telegraphy that a certain amount of distortion is introduced by the terminal apparatus without materially interfering with the quality of transmission. The resistance of loading coils need not therefore be unreasonably small, provided the distortion caused by its insulation is only a small part of the distortion already existing in consequence of the terminal apparatus which was used prior to its installation. It is, therefore, evident that between the extremes of an ideal coil of prohibitive cost and a cheap coil which introduces an unreasonable amount of distortion there must be an interval of iron core losses within which the coil will satisfy both the conditions of economy and transmission.

How Resistance Figures.

The increase of resistance due to energy losses in the iron cores of a loading coil should, for a frequency as high as 1,500 p.p.s. be smaller than the true ohmic resistance of the copper of the loaded wave conductor and greater than one-tenth part of such true ohmic resistance. It will be readily seen, therefore, that in loading limit will be approached, and in loading a low resistance aerial cable, an approach to the upper resistance limit will be sufficient. The true ohmic resistance of a loaded wave conductor includes the true ohmic resistance of the inductance coil windings, which can always in practice be much smaller than the true ohmic resistance of the wave conductor before loading and is, in fact, usually about one-fourth in the case of low resistance aerial lines and one-tenth in the case of high resistance cables. It will therefore be seen that the rule, that the increase in resistance due to energy losses in the iron cores of the loading coils shall be smaller than the true ohmic resistance of the copper of the loading conductor, means approximately that it shall be greater in any coil than five times the true ohmic resistance of the winding of the coil, and that the rule that the resistance due to energy losses in the iron core shall be greater than one-tenth part of such true ohmic resistance means, in the case of coils for loading cables, that the increase in resistance due to iron core losses shall be greater than the true ohmic resistance of the coil. Expressing this rule as a reference to the coils themselves, without any to the loaded conductor, it requires that the increase of resistance due to iron core losses of the coil shall, for a frequency of 1,500 p.p.s. and for the current strengths used in telephony, be not less than the true ohmic resistance of the coil, nor more than five times such true ohmic resistance.

Meeting Line Demands.

The iron core is composed of torroidal form core, the iron wires of which are insulated from each other. Let "A" equal the external diameter of the plates, "B" equal the internal diameter of the plates, "D" equal the thickness of one plate, "N" equal the number of plates and "u" the permeability of the iron wire, "Q" equal the specific resistance of the plates in C.G.S. units, "F" equal the frequency of the simple harmonic magnetizing force, "S" equal the number of turns in the winding, "L" equal the inductance of the coil, "R_1" equal the resistance of the coil due to current losses in the core, then we should have the following relation:

$10^9 L = 2s\ n\ d\ u \log b$

As a specific example let L equal .2 henrys and let R_1 equal 8 ohms at a frequency of 1,500 p.p.s., then such coils placed every 2½ miles in high resistance telephone cable such as 170 ohms per mile of circuit, or every 12 miles in a low resistance telephone air line, will satisfy all the requirements of correct loading and the increase in resistance due to hysteresis losses will be within the economic interval as specified above. It has been generally accepted that, according to Lord Raleigh's investigations, there is no hysteresis losses in hard drawn iron wire, so long as the magnetizing fore per cm. is less than .04 in C.G.S. units. Under these conditions there would be then no increase in resistance in the magnetizing coil due to hysteresis. It has, however, been found that the increase in resistance due to these losses is very large, particularly with the high inductance coils considered here. Experiments have shown that the hysteresis losses per second in the case of weak sinesoidal magnetizations up to about 10 C.G.S. lines of force per square cm. is proportionate to the cube of the amplitude of the induction density and also proportionate to the frequency. The increase in resistance R_s in ohms, due to this loss, can be expressed by the following formula: $R_s = A s^3 C f$ "A" is a constant to be determined experimentally, "S" is the number turns in the coil winding, "C" is the magnetizing current in amperes, "f" is the frequency of the current. The experimental constant "A" depends entirely on the size and shape of the core. A finely divided core of small laminations can be used so that R_1 is about one tenth of the true resistance of high resistance telephone cables and about equal to the true resistance of low resistance aerial lines for frequency of 1,500 periods every second, then for current up to 5 milliamperes, at a frequency of 1,500 periods per second, R_2 will be a small fraction of R_1, since the number of turns per cm. of the shortest magnetic line of force is not greater than 60. This will give a practical approximation of the constant "A." To take this example, let there be 666 plates of iron wire. Since each one is .0075 cm. thick, we shall have in the formula for "L" the product $n\ d = 5$. Let the internal diameter of each plate be 4 cm. and the external diameter 8 cm., hence log. a equals .7 approximately. Finally, since L equals .2 and "u" equals 10^3, we shall have $.2 \times 10/9 = .2 \times s^2 \times 10^3 \times 5 \times .7$, hence "s" equals 535 turns.

The shortest magnetic line of force is a little more than 12 cm., hence there will be less than 60 turns per cm. and the increase in resistance due to hysteresis will be up to 5 milliamperes and 1,500 p.p.s. a small fraction 8 ohms.

Cross-Talk in Phantom Loaded Circuit.

One of the primary sources of poor transmission in a loaded circuit is brought about by the cross-talk. It is not only necessary to design loading coils and cable so that they will be individually free from disturbances, but it is necessary to also design them so that when they are connected together the cross talk which may be present in each is reduced rather than increased. It will be clear that the algebraic sum of a plus and minus disturbance in a loading coil and a loaded telephone cable is a convenient method of reducing such disturbances to their minimum value. Where a system of loaded circuits is installed in an efficient manner, this efficiency can be destroyed due only to primary causes that may be brought about in the commercial use and maintenance of a circuit of this nature.

As an example, in connection with phantom loading circuits, it may be found necessary to change the type of circuit from one which is properly organized to prevent disturbance to one which tends to introduce disturbance from other circuits and frequently brings about crosstalk between the phantom circuits in a cable.

An instance of this is where open wire circuits are led into central sta-

tions through non-duplex cable, in which the sides or physical circuits of each phantom are carried by separate pairs instead of through duplex cable, having both pairs of the phantom assembled in a quad. It has been the general practice to install phantom repeating coils at the end of the open wire circuits and bring in the phantom from that point by means of physical circuits furnished by the separate pairs in the cable. It will be clear that the conductive continuity of circuits of this kind is interrupted at the repeating coil is a standard repeating coil is used for this purpose.

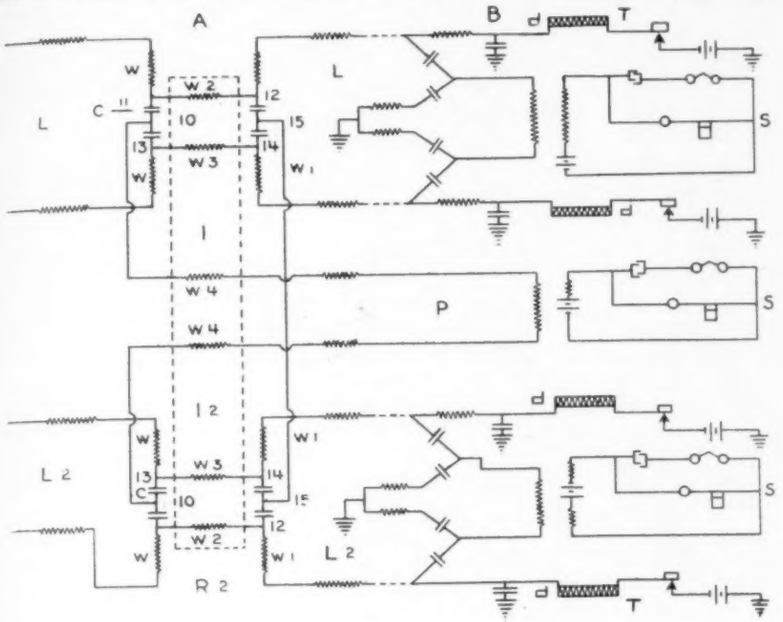

FIG. 1

Introducing Telegraphy.

When it is desired to bring in telegraph circuits it is also, of course, necessary to install the composite telephone and telegraph sets at the junction of the open lines and the cable, and the telegraph legs of the circuit must therefore be brought to the central station by separate conductors. Even if composite circuits are not used, it will be evident that an arrangement must be made for closing the circuits to permit of ordinary testing of the circuit. In this case relays must be associated with the phantom repeating coils and the conductors in the cable so that such relays may be controlled from the central office. Apparatus of this kind, containing many moving parts, is subject to rapid depreciation in commercial use and requires, therefore, a considerable amount of maintenance, and when apparatus of this kind is located outside of the main plant it becomes difficult to operate and maintain, and also requires the presence of added conductors in the cable which also bring about additional disturbances in the cable. Provided a repeating coil or other phantom transformer is devised which would furnish a direct current path through the repeating coil, and such a repeating coil is designed so that there will be no unbalances in the phantom circuit, neither from phantom to side or phantom to phantom, crosstalk in the cable will be overcome. Means will also be obtained for balancing the impedance of all of the circuits in the cable. In a circuit of this kind it is plainly evident that the impedance of the circuit beyond the repeating coil will be different than circuit leading into the exchange. In loading cable this difference in impedance is overcome by loading a half section in each side of the exchange rather than the whole section. Means must be provided, however, in a system such as has been described, to take care of the difference in impedance between the phantom circuit and its physical extension.

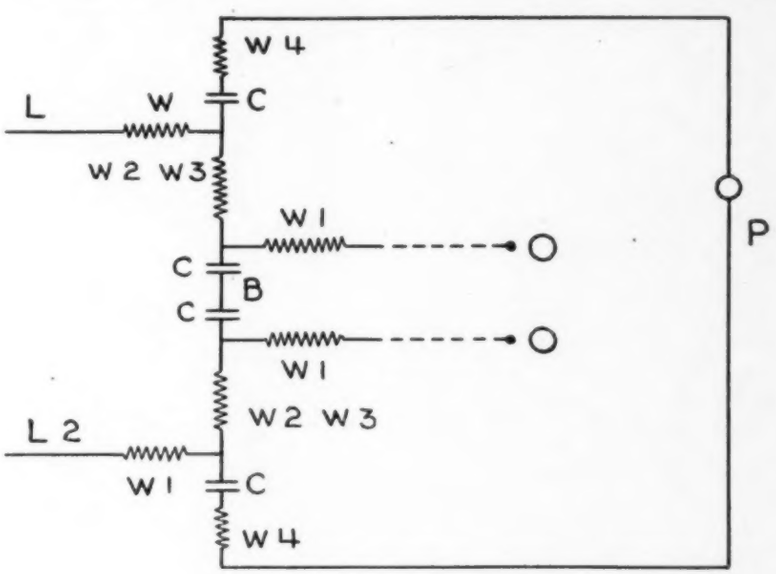

FIG. 2

Explanation of Figures.

Fig. 1 illustrates the application of this system to that section of the phantom circuit in which the impedance is to be stepped up. Fig. 2 shows the same organization in a simplified diagram. Fig 3 is a diagram of an auto transformer that is used in the system shown in the Figs. 1 and 2. Figs. 4, 5 and 6 correspond to Figs. 1, 2 and 3, illustrating an arrangement for producing a stepping down of the phantom impedance. In Fig. 1 lines L and L² of the open wire loaded circuit are being continued from point A at the outskirts of the city to a central station B by the non-duplex cable extensions 1 and 1², which are also loaded. To each line may be connected telephone apparatus S. Composite sets provide for transmission over each of the conductors of the open wire line and its cable extension, customary telegraph apparatus being contained in the Morse legs T of the circuit. To allow the formation of the phantom, devices are located at the junction A between each of the lines L and L² and their extensions 1 and1². These devices in the present instance consist of the well-known phantom repeating coils R and R², having line windings w, w and extension or drop windings w', w'. These operate to convey from one section to the other, voice currents flowing through the conductors of

the said circuits in series and to furnish points 10 between the windings w, w, which are neutral with respect to the side circuit to which the physical extension p of the phantom may be joined to conduct voice currents passing through each of the pairs of the conductors of the lines L and L^2 in parallel. To the extension p is connected the telephone apparatus S. The impedance of the extension p is greater than that of the open wire phantom, as an assumption and as would be the case if the phantom extension were loaded to approximate the impedance of the side circuits L and L^2. Since the phantom repeating coils open the sections of the conductors L, L^2 and 1, 1^2 to direct current means are provided for conductively associating each of these by the windings of auto-transformers I and I^2, which also serve the purpose of stepping up the impedance of the phantom to that of its extension circuit. The method of using these auto-transformers is shown in the diagram of Fig. 2 in connection with Fig. 1. In Fig. 2 the light lines represent single conductors while those corresponding to two conductors in parallel are heavy. Windings w^2 and w^3 of each transformer are wound as bridge wnidings, uniting at points 11, 12, 13 and 14 respectively at the inner extremeties of the windings w and k^1 of the phantom repeating coils R and R^2. In this manner a path for telegraph or other direct currents in any of the side circuits and their extensions is obtained. Bridged across points 11 and 13 are the balanced condensers c, c, between which the connections 10 for the conductors of the phantom extension p are made. In each of the phantom extension conductors is a series winding w^4 of the auto-transforme. In a bridge between the points 12 and 14 at the inner ends of the drop windings w′,w′ of each phantom repeating coil is another pair of balanced condensers c′,c′ and at neutral points 15 at the center of each is joined the conducotr b, concluding a short circuiting bridge. Referring to Fig. 2, it will be clear that the windings w^2 and w^4 of the auto-transformer. In a bridge with the condensers c′ and the connection b, are in a bridge of the phantom at the junction of the low and high impedance sections, while the windings w^4 are in series with the physical extension of the phantom. In this case the reflection reducing effect of the transformers equals the ratio of the impedance of the series windings w^4 inductively associated with the bridge windings w^2 nad w^3 in parallel-series-aiding to the impedance of the bridge winding in parallel-series-aiding. This relation may be varied to meet any particular conditions which may be encountered.

Since the transmission losses in the auto transformers are low and are proportionate to their self and mutual impedances their location in the circuit is not objectionable. With respect to the side circuits, the bridge windings w^2 and w^3 are in series opposing and as they are included in the side circuits close to neutral points, practically none of the current in these circuits flows through them, therefore the transmission losses here are slight also. Since the series windings w^4 are entirely removed from the side circuits they have no effect upon them. The conductive connection between lines L and L^2 carry the phantom current and the side circuit extensions 1 and 1^2 make possible an unbalance of the phantom circuit that may cause cross talk. If one of these extensions is ewitched to a line having greater admittance to ground, then the line to whic hthe other side of the circuit extension may be united, because more phantom current will pass to ground through one of the connections than through the other. But, since the terminal conditions of the side circuit extensions are practically without influence on the phantom circuits because of the conductive association of the side circuit extensions at neutral points 12 and 14 located in a bridge consisting of the transformer windings w^2 and w^3, condensers c′ and the conductor b, the impedance of the condensers being low in comparison with that of the windings in parallel-series-aiding, reduces to a negligible minimum any induced potentials to ground brought about by the difference in admittances to ground of the side circuit terminal extension.

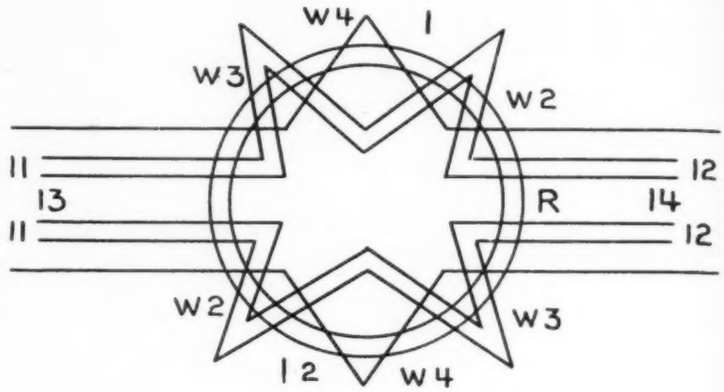

FIG. 3

Eliminating Disturbances.

The conductive relations between the phantom lines of the non-duplex side circuit extensions do not permit noise induction and crosstalk because of the fact that the side circuit extensions are not properly balanced in the cable for phantom working. This causes the phantoms to crosstalk and also tends to be affected by the noise induction carried through the terminal cable by any other phantom or physical circuit or because of exposure of the terminal cable to foreign disturbing systems such as street railroads and power circuits. The causes of crosstalk as stated are practically eliminated by the method of excluding the phantom current from side circuit extension and the noise disturbances are minimized by preventing noise induction that is picked up by the side circuit extensions, acting as an unbalancing element of the phantom circuit from being transferred to the balanced portion of the phantom circuit. This result is accomplished by the bridge arrangement of the phantom outlined in the circuit, because the auto-transformer bridge windings w^2 and w^3 because of their impedance oppose the transfer of crosstalk and noise currents between the balanced and unbalanced elements of the phantom circuit and vice versa, while they, at the same time, assist in the establishment of the conductive-through circuit required for Morse or testing purposes, and the condensers c′ in conjunction with the short circuit b act as a low impedance shunt across the series path of the disturbing currents, which includes the high impedance auto-transformer windings. Conductive interference between the Morse legs is avoided by the presence of the condensers c and c′ in the phantom-connecting and short circuiting bridges, the capacity of these condensers being small enough to prevent cross fire, of the telegraph circuits, and yet of sufficient capacity to give good telephone transmission.

Fig. 3 of the drawings illustrates the fact that the windings 1 and1^2 are preferably placed upon a common core,

in order that the balance of the windings may be perfect. It is by this means that crosstalk is practically eliminated, namely by a complete balance, whether it is in the form of a winding or in the laying up of the pairs or quads in a cable. In this transformer the windings for each side circuit are placed on the opposite halves of the corroidal core R. The bridge windings w^2 and w^3 are preferably in the form of a twisted pair extending uniformly about each half of the core. By this means the best balance is obtained and it is, of course, convenient in winding while the increased capacity effect between the conductors is not objectionable on account of their practical freedom from side circuit current. The series winding w^4 is carried outside the corresponding bridge windings about the half core. The phantom coil windings of the transformer 1 and 1^2 are distributed evenly about the entire core, preventing, in this manner, any leakage losses. For stepping up the impedance of the line phantom to that of the phantom extension in the ratio of 1,400 to 1,800 we have the following windings: Each bridge winding w^2 or w^3 in either coil I or I^2 has 1,392 turns of No. 26 B. and S. gage single cotton-covered copper wire, having a direct current resistance of 44.1 ohms and impedence values together in series-parallel-aiding to phantom current of 800 periods per second of 5,400 ohms resistance and 7 henries inductance; each series winding w^4, 187 turns No. 16 B. and S. gage single cotton-covered copper wire, direct current resistance 0.7 of an ohm, impedance together in series-aiding 99 ohms and .13 of a henry. The mutual impedance between the bridge and series groups would be 730 ohms and .95 of a henry. The condensers c and c′ of this system would have capacities of about two microfarads each.

It may occur in practice that the phantom circuit extension is of lower impedance than the line portion, as for instance the case of terminating a loaded open wire circuit in a non-loaded physical cable circuit. Here it is necessary to so locate the series windings that their impedance is applied to the line portion of the phantom, so that they are in direct conductive relation with the line wires of the circuit. Such an arrangement appears in Figs. 4 and 4 of the drawings. The circuits L, 1, L^2, 1^2 and p and the phantom repeating coils R and R^2 are as before. So too are the bridge windings w^2 and w^3 of the auto-transformers I and I^2 and the short-circuiting bridge c′ b c′, but there is a series windinw w^5 or w^6 for each of the side circuit conductors from points 16 and 17 at the inner ends of the line windings of the phantom repeating coils to points 18, 19, respectively, at the inner extremities of the bridge windings w^2, w^3. The condenser bridges providing the neutral connections 10, 10 for the phantom extension p are taken from points 18, 19. The reflection-reducing efficiency of this arrangement will be measured by the impedance ratio of the parallel-series-aiding grouping of the series windings w^5, w^6, inductively associated with the parallel-series- aiding grouping of the bride windings w^2, w^3. The paths for the conduction of direct current are through the series and bridge windings w^5, w^2 and w^6, w^3 in series.. A bridge containing a condenser c^2 is placed across each side circuit at points 16 and 17, to aid in reducing side circuit transmission losses in the series windings of the auto-transformers, by acting as short circuit of telephone frequencies. The auto-transformers for this circuit ae assembled upon a single core with the elements belonging to each side circuit on separate halves. As the pairs of series windings, like the bridge windings, are practically free from side circuit curent, they may also conveniently be carried through the twisted pair. For a circuit in which the open wire phantom presents an impedance of 1,400 ohms while the terminal cable has an impedance of 900, a coil with windings as follows might be employed. Each bridge winding w^2 or w^3, 1,117 turns of No. 26 B & S gage single cotton-covered copper wire with a direct current resistance of 35 ohms and an impedance value together in series-parallel- aiding of 3,535 ohms and 4.5 henries; series windings w^5, w^6 each 280 turns of No. 20 B & S gage single cotton-covered copper wire, direct current resistance of 2.5 ohms, impedance together in series-parallel-aiding 222 ohms and .28 of a henry. The mutual impedance between the bridge and series groups would be 885 ohms and 1.12 henries. The microfarad condensers c and c′ might be used, while the condenser c^2 would be one microfarad or less.

Copper Wire Record Order Shipments to Begin.

San Francisco, Calif.—As soon as freight rate reductions from Anaconda Copper company mills become effective this month, shipment will be started on the 10,000,000 pound copper order placed by the Pacific Gas & Electric Co. By paying $1,300,000 cash the Pacific organization got the lowest price on copper for many years. The Anaconda mills will be running for three or four months more at full capacity on this 2,500 reel power transmission line order which is well ahead of the largest previous record.

"DOCTOR" or "PHYSICIAN"?

Massachusetts Phone Rate Hinges on Differences in the Nomenclature

Boston, Mass.—The Department of Public Utilities recent ruling on the petition of the Somerville (Mass.) Medical Society regarding the application of business or residence rates to the telephones installed in homes of the doctors of medicine, is summarized as follows:

"A doctor of medicine who desires the word 'physician' inserted after his name may be treated by the company as having already stated that his use of the telephone at his residence is primarily for occupational purposes. A doctor of medicine, on the other hand, who does not desire the word 'physician' inserted after his name, but is content with the insertion of the abbreviation 'Dr.' thereafter, shall not be bound by the interpretation stated above, but shall pay business rates only (1) if he admits that his use of the telephone at his residence is primarily for occupational purposes, or, (2) if he does not concede this fact, but the evidence clearly indicates that this is the primary or chief use to which his telephone is being put, which we hope will rarely prove to be the case. Where, however, the use of his telephone at his residence is primarily for social or domestic purposes, the doctor is bound to pay only residential rates.

"Very likely a number of physicians have reported their telephones one way or the other without the foregoing distinctions clearly in mind. It seems to us highly proper, therefore, that the company should base its future ratings of doctors upon such listing as may be adopted and such classifications as may result therefrom in the light of this decision, and should disregard such listing and such classification of physicians at their residences as has been previously made. The company should, in brief, recanvass the situation anew."

Praises Staff in Handling Phone Building News Story.

Jackson, Mo.—What the people here think of their telephone company is stated in the Jackson Book which recently carried a story on the enlargement plans of the Cape Girardeau Bell Telephone company. The local sheet remarked: "Jackson has one of the best small telephones offices in the state, and our operators are always 'on the job,' ready, pleasant, and obliging, careful of business matters and helpful in information."

OPINIONS AND COMMENTS

"THE CUSTOMER'S RIGHT."

Marshall Field's famous policy, "the customer always is right," is the basis upon which D. C. Phillips, the head of the Citizens' Telephone Company of Marengo, Iowa, operates.

Mr. Phillips says, "We have only one rule—'the subscriber is right.' Every question is settled upon that basis, and every employee understands it."

A policy like this isn't adopted lightly. There are too many obstinate and uninformed in every community to permit that phrase to be held just because it listens good.

But when you can adopt it and live up to it, you will have Marengo's success in rate raising. More money was required for the service being given by the company, and a simple announcement put across the raise, with a net gain of subscribers.

They know where they stand in Marengo, for even the company's letter heads state the basis of mutual satisfaction, in these lines, "The Telephone Company's first obligation to the community is good service. The community's duty to the Telephone Company is a fair rate."

"DAMNITIS."

Here is a good word Webster overlooked; damnitis.

The Financial Insurance News gives you an idea of what "damnitis" means. This journal says: "Whenever a public utility seeks justice in the interest of rendering good service to this metropolis of ours (Los Angeles) the fever of damnitis begins raging in our body politic."

Damnitis, although but recently named, is a disease from which the harassed telephone man has suffered much. Its symptoms become especially apparent among legislative bodies just before election time. It may quickly develope into a serious epidemic unless heroic treatment of printer's ink is administered.

Beware damnitis.

THE LIFE LINE.

Business needs all the order getting help possible.

Territories that have been sending in plenty of business during the past few years have failed.

Printers' Ink, an excellent magazine for sales executives, tells of some methods that have been successfully employed in bringing business back to normal, and among the means mentioned as surest to do the work is the greater use of the telephone. It tells of a company that is weathering the storm by active use of long-distance telephone calls.

This is the time when the nation's business will learn the value of the telephone as a selling force as never before.

Are you making the most of your opportunities for toll profits? In them you have the life line for many industrial establishments.

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ADVERTISING

TELEPHONE ENGINEER is issued the 15th of each month. Copy can be accepted as late as the 10th of the month preceding date of publication. Where proof must be seen, allow ample time for transmission in the mails. Display Advertising—Rates on application. Classified Advertising—"Wants," "For Sales," etc.—$4 an inch, or 7 cents a word per insertion.

READ AND REJOICE.

You can't build a factory on hope alone.

Hard Cash and substantially founded promise of continued prosperity and growth are needed for the plants that are being erected in the telephone business these days.

Just consider the stories of new plants in the telephone manufacturing and supply business that appear in this issue of TELEPHONE ENGINEER.

Monarch gets into a great new sun-lit home, where money has been spent without stint to build upon its fine foundation. Federal is old enough to vote and unworried by the income taxes on a busy and advancing enterprise. Western Electric startles industrial Manhattan with the completeness and efficiency of its new establishment. Runzel and Lenz put up a money-making mounment to the success of their telephone business.

Show us another industry in the country that can compare with ours in these evidences of prosperity.

Sure we have our troubles. We thrive on them. They have made us great.

Undaunted by gossip of "conditions," sure of its ground and its future, the telephone business enters upon the greatest era of its history.

And one of the biggest reeasons why the business grows is that the men in it are unafraid—especially unafraid of work.

The Fifth Ave. (N. Y.) Coach Company claims 98 percent of its men are courteous under all circumstances. Now let's have the figures on telephone operators and we'll be getting somewhere about this matter of sex supremacy.

Telephone men who think their business troubles are acute should compare notes with other executives. Comparatively speaking our business is an oasis in the desert.

BUSINESS FROM PHONE ADS

"THE CAFETERIA IDEA APPLIED TO THE TELEPHONE."

"The president of the Philadelphia Chamber of Commerce so referred to the Automatic telephone before the business men of the city recently. In that one short, crisp sentence he voiced his impression of a practical time-saving service, with all unessential moves eliminated, with the interval between requestinf and receiving service reduced to a minimum—a service that is without frills and furbelows — a service that serves!

"Know the significance of 'Dial-Talk-Smile.'"

—Keystone Telephone Co.

Here's How to Sell by Telephone.

Select 100 customers, or prospects.

Give the names to a good salesman, preferably a road man who knows them personally.

Ask him to call them by telephone on a station-to-station basis. He can do it in two days.

Let him talk just as he would in a personal visit. He can explain your goods, quote prices, answer questions, take orders and arrange for prompt delivery.

The following week do the same with 100 others.

Keep it up for a month. About $200 will pay the toll charges for 500 station-to-station business calls distributed over New England.—New England T. and T. Co.

"If you try it (long distance selling at station-to-station rate), we are equally confident that you will extend your selling by telephone service until it becomes an important factor in your business development." — Providence Telephone Co.

"A Buyer Is Looking for You"

"In every line of business every day, buyers who are hunting sellers refer to the telephone directory. They can't help seeing the ads there.

"If you are a directory advertiser you already are in touch with this buyer, who is looking for you."—Kansas City L. D. Telephone Co.

"Telephone wages should not be reduced for many years to come. They never have been up to the level paid for similar labor in other lines of industry. Telephone material shows practically no decline in price, and there is little prospect of any until the supply more nearly equals the demand.

"Additional revenue was necessary to safeguard the service, the investment and the public and the increase allowed by the court was designated as "the lowest possible amount" required to accomplish these things."—The Tri-State Telephone and Telegraph Co.

"As carefully as the sentinel guards the camp of his comrades in time of war, we guard your telephone talks over the long-distance telephone lines.

"Your telephone is sheltered in home or office, but the wires connecting it with telephones in other cities and towns cross the hills and storm-swept prairies, subject constantly to the ravages of the elements.

"Day and night the wire chiefs watch the circuits, testing them, keeping them clear and preparing in cases of emergency to rush repairmen to the scene of trouble at any hour."—United Telephone Co., Abilene, Kan.

Oil men in the southwest are taking to flying because of the speed demanded in their hair-trigger operations. Here is how the Southwestern Bell Telephone Company's publicity staff uses the facts in a strong advertisement in an oil paper:

Faster Than Flying
—THE—
TELEPHONE
For Out of Town Business

Recent extensive improvements in long-distance telephone facilities in the new oil cities of Texas gives a complete communicating system entirely capable of caring for long-distance telephone demands in our growing communities.

A person in a distant city is as near to you as your telephone. A few words to the operator will enable you to talk to a person or firm hundreds of miles away as easily as you can talk to your neighbor.

SPEED is of undoubted advantage to the business man. By long-distance telephoning you accomplish maximum results in the minimum time.

SATISFACTION—The equivalent of a personal visit is gained by long-distance telephoning.

ECONOMY—The cost of long-distance telephoning is insignificant when the vast advantages are considered.

Fifteen Months of Effort on
The World's Greatest Telephone Job
Here are the Results!
NEW YORK TELEPHONE COMPANY
The Telephone Instrument
is only 2% of the equipment
required for Telephone Service
NEW YORK TELEPHONE COMPANY

Who Could Miss These on a Crowded Page?

Blythe and Niland, Calif., to Get Toll Link.

Blythe, Calif.—The Colorado River Telephone Co. is to spend $25,170 on a toll line between this city and Niland.

SALES $20,000,000 MOSTLY BY PHONE CALLS.

When the president of one of the largest, oldest and best known wholesale houses in New England says that a very large part of the $20,000,000 sales by his company in 1920 were made by telephone, it is absolute proof that extensive, persistent and intelligent use of the toll service results in increased business and larger profits.

With the permission of the writer, we reproduce the following excerpt from a letter from George N. Chamberlain, president of Chamberlain & Co., Inc., wholesale dealers in dressed beef and provisions.

"We are great believers in the telephone being the most efficient and economical way of getting business, for it saves both time and money for us.

"Our sales for 1920 were over $20,000,000. With the exception of what was sold direct to customers by our store and road salesmen, our sales were made over the telephone to customers in all parts of New England. We often make more than 150 toll calls a day."

Put your best men on the telephone job for a month and see the results. If you use it intelligently, $100 will do wonders.—Providence Telephone Co.

The Human Side of Your Service.

About three and one-half million dollars are invested in poles, wires, buildings, switchboards, underground conduits and other appliances of the United and Consolidated Telephone companies which serve central and northwest Kansas. If destroyed, they could be rebuilt.

But what is the value of the human organization that makes this equipment function? There are upwards of 800 men and women engaged in giving you telephone service. They are human, just like yourself—they eat, sing, cry, laugh, get peeved and get over it—and some ride in Fords. They are your neighbors and friends.

As telephone employes they are public servants. Their success depends on the co-operation they receive from you—the public.

Your telephone is a door—lift the receiver and it opens to 35,000 of your neighbors. Miss Operator is the doorkeeper. At your command she summons any one of this vast army to you. She works conscientiously and courteously. She is not a machine—she is human. She is working with but one ideal.

"Service first and before self."—Consolidated Telephone Company, Abilene, Kan.

REAL HELP IN ADS.

Telephone Company Advertisements Give Readers Some Ideas for Making Money.

Telephone company advertising men rank high as public servants. With business institutions confronted by the stern necessity of bucking hard competition and overcoming sales inertia, the telephone evangels have batted up with many definite suggestions for business cultivation via phone.

Some of the paragraphs containing suggestions and accomplishments which appear in recent telephone advertising follow:

Radiate optimism and watch your sales force respond. Then "follow through" by close co-operation and personal contact when the men are out on the road bucking up against real competition. How?

Use the long distance telephone.—Northwestern Long Distance.

WHAT $50 WILL DO BY TELEPHONE.

By using station-to-station service you can talk with seven customers in each of 12 New England cities (Bangor, Lewiston, Portland, Nashua, Manchester, Rutland, Burlington, Worcester, Springfield, Fall River, New Bedford and Providence), at an average cost of less than 70 cents per call.

You cover over 2,500 miles in a day—that saves time.

You cut selling expense—that saves money.

You get the personal talk—that is direct and forceful.

You get quick action—that is modern business efficiency.

Don't watch and wait for business to come to you; go after it by telephone.—New England Telephone & Telegraph Co.

SELLING COST 4-10 OF 1 PERCENT.

"The bulk of our business, since the formation of our company, has been obtained by telephone solicitation," says T. A. D. Fessenden, treasurer of the Union Chemical Company, Boston.

In a recent letter to us he says:

"Our experience has shown us that selling expenses for personally solicited business, exclusive of salary, amount to no less than 4 percent of gross sales. The actual cost of our telephone salesmanship has been less than four-tenths of one percent.—New England Telephone & Telegraph Co.

THE LUCKY SEVENTH.

Newspaper Gets More Advertising with "Come Seven"—It's Lucky Telephone Number.

Lawrence, Kan.—Lawrence citizens are learning to connect good fortune and the numeral "seven" with want ads rather than Nubian polo, as the result of an advertising campaign being conducted by the classified advertising department of the Lawrence Gazette. The paper's telephone number, seven, is being featured by lively advertising copy.

A typical Lawrence Gazette classified advertisement runs:

ARE SOME TELEPHONE NUMBERS LUCKIER THAN OTHERS?

Who has the luckiest phone number in town?

Over in Japan, the telephone number "eight" is considered the luckiest number.

It costs the subscriber who holds it nearly $500 a year.

Another lucky number, according to the Japanese, is "357."

Numbers 42 and 49 are held to be unlucky and are usually assigned to police stations. Fair enough!

The telephone number of the Gazette is 7.

MAKE TOLL CALLS FROM HOME.

Every residence Bell telephone is the same sort of a long distance instrument as the one in your office. Matters that slip your mind during the stress of your business day can be attended to by long distance Bell telephone from your home at night.

The low night rates make this a profitable convenience.—Cumberland Telephone & Telegraph Co., Inc.

NO CLOSED DOORS TO THE LONG DISTANCE CALL.

Have you ever been in an office when somebody called the manager or proprietor for long distance telephone? Did you notice how he let other matters wait while the answered the call?

Long distance goes straight to the man you want to reach—gets his full attention without delay or postponement—gets the answer for you immediately.—Chesapeake and Potomac Telephone Co.

Hail W. C. Jacobs, Telephone Engineer, as City Builder.

Chambersburg, Pa.—To mark the 38th anniversary of the introduction of the telephone into Franklin county, Pa., an enterprising reporter waylaid W. C. Jacobs and secured from this telephone leading light an interview in a reminiscent strain. To show how Mr. Jacobs stands in his community we quote: "The people here hold him in the highest respect. They have a reason for so doing for it was Mr. Jacobs that gave to them the telephone and if he hadn't done anything else that in itself would be sufficient to make our people love him."

Wilber, Indiana Bell Engineer, Dies at Indianapolis.

Indianapolis, Ind.—After an illness of six months, Bertram DeWitte Wilber, state engineer for the Indiana Bell Telephone company died at his home here recently, at the age of 47. He was born at Grand Rapids, Mich. After graduating from the University of Michigan he entered the employ of the Western Electric company. Later he worked for the Central Union Telephone company, going to Indianapolis in 1905.

Bob Gordon is the dean of the newly appointed Western Electric managers. More than twenty-seven years ago he started as a clerk in the clerical department of the Gotham house. Since 1901 he has been known at various times as storekeeper, supply department manager, assistant supply sales manager, supply stores manager, stores manager, and now he has been promoted to stores manager of the New York Telephone distributing house.

Transfer of E. R. Chamberlain, for six years commercial manager at the Mount Vernon (N. Y.) office of the New York Telephone Co., to a Bronx office, was made the opportunity for expressing some laudatory opinions of his ability and service to the community, in Mount Vernon newspapers.

Robert Traylor, formerly of Little Rock, Ark., has assumed the management of the Jonesboro, Ark., telephone company, succeeding L. E. Benton, who was transferred to Helena.

"Taps" for Capt. Stevens, Confederate Vet.

Cookeville, Tenn.—Capt. G. W. Stephens, for 25 years president of the Gainesboro Telephone company of this city, died recently at his home in Vernon, Ky. The captain was an ex-Confederate soldier, serving with distinction during the Civil War. He acquired a considerable fortune from his numerous enterprises.

Brandeburg, Interstate Man, Wins Army Honors.

Fort Benjamin Harrison, Ind.—F. C. Brandenburg, formerly with the Interstate Utilities company at Spokane, Wash., has been promoted to commercial telephone engineer and transferred to this post from Fort Sheridan, Ill. There are only three engineers in the army of this classification.

WOMAN ON BELL BOARD.

Mary T. Reuse on Bell Employee Benefit Fund Committee— An Ex-operator.

New York Cit.—Mary T. Reuse, who began her telephone career as an operator in Chicago in 1896, has been selected a member of the Employees' Benefit Fund Committee of the American Telephone and Telegraph company. Miss Reuse is the first woman member of the committee. She will advise Vice President E. K. Hall regarding personnel work among the women members of the organization.

Miss Reuse is admirably fitted in personality and training to the work called for by the recent appointment. Through long and close association with the women employees of the Illinois Bell Telephone company, she has acquired a penetrating insight into the conditions governing the success of her new work.

HELP WANTED

Man to have supervision of maintenance of switchboard and outside plant. Must be an executive and systematic. Large Indiana city having 14,000 stations.

Address Box 950 Telephone Engineer, 443 S. Dearborn Street, Chicago.

Chance for Inventor — Smeller Wanted on Cuban Calls.

Indianapolis, Ind.—Frank Wampler, vice-president and general manager of the Indiana Bell Telephone Company, was present when one of his subscribers was talking over the new line to Cuban. An interested by-stander asked the Indianapolis speaker, "Jack, can you smell Mike's breath?" Wampler remarked: "If he can, I'll charge him extra." The Indianapolis telephone officials have arranged for a long-distance address via the Cuban cable before the local electric club. C. W. Ricker, Havana utility chief, is to speak.

John R. Maxon, "Youngest Old Man in Business."

Minden, Neb.—John R. Maxon, manager of the Northwestern Bell at this city, is claimed by Northwestern Bell men to be "the youngest old man in the business." Maxon has been manager of the Minden exchange since 1899. He has organized both the Minden and Axtell, Neb., exchanges, and still is "hitting on all twelve." He is a member of the Telephone Pioneers of America.

Devotes Two Floors to Its Operators' Comfort.

Hartford, Conn.—Almost two floors of the recent addition to the Southern New England Telephone company's building here are fitted up with the conveniences of a modern hotel, plus the coziness and comfort of a home. All for the operators. A perfectly appointed recreation room, a rest room, "quiet" room, check room, baths, and two dining rooms have been outfitted by the company. Local newspapers say the telephone company's girl employes are envied by other working girls in the city.

"Noble" was Service Keynote As Well as Greeting

Des Moines, Ia.—With telephones run into sidetracked Pullmans which served the Mystic Shriners as headquarters during the recent Shrine covnention here, and with many extra booths, and an extda exchange, the local telephone company handled more than 300,000 telephone calls daily during the meeting.

Marengo A Model

By W. C. Swain

Does it pay to advertise?

Although advertising in the telephone field has not been as intensive as in the case of other local commercial institutions ,there are many exchange managers who have felt that a certain amount of advertising is a positive necessity.

Building the subscriber list, building up good will in the community, advertising special services like P. B. X. installations or extension sets—and rate raising!

This last is where Mr. Phillips of the Citizens Telephone company of Marengo, Iowa, got in some good work. A letter carefully prepared was sent to the good people of Marengo telling them that with the installation of new equipment the rates for service would be advanced. And he told them just what they might expect in return for this increase in rates. That their telephone service would be the very best the modern engineering facilities could provide.

What was the result?

There were more telephones after the cut-over than before.

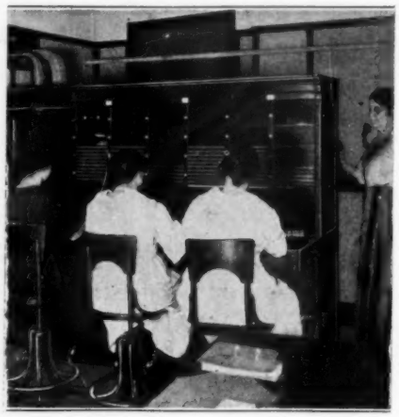
The cut-over that had been looked forward to by the inhabitants of Marengo, Iowa, and also by the officials of the Citizens Telephone company for some time, took place without a mishap.

The Marengo plant has grown from 510 telephones to the present standing of 822 stations and switching 107.

For the past several years the equipment had been in poor condition to furnish the subscribers with the kind of service they were entitled to. Mr. Phillips, who is president of the Citizens Telephone company, together with his co-workers, began making improvements in the service immediately after assuming the management of this company, which was about three years ago.

Many distinct improvements were made, but it was found that in order to get real service, new equipment must be secured, and they finally decided to purchase a Kellogg service switchboard, and the order for this board was placed a short time after.

This equipment was installed in the new building, on one floor. New floors and partitions with nicely decorated walls makes this a very pleasant office. The north room contains the terminal rack where the cables, which come in underground, are fanned out and numbered. The power panel and charging machine are also found in this room. A mercury arc rectifier is used for charging the storage battery. Two sets of ringing machines were installed. Nearby are placed the interrupters by which the machine ringing is controlled, the bell of the called party ringing one second, and the idle four seconds, and repeating this operation until the called party answers or the calling party hangs up.



All's Merry at Marengo

The board is installed in the front room of the building, where there is plenty of light and ventilation. Handy to the entrance are two telephone booths.

This Equipment Makes Raise O. K.

Mr. Phillips, in deciding upon the Kellogg service switchboard, took into consideration the subscribers' viewpoint of service, simplicity of operating, ease of maintenance, and the money-making possibilities. The following ten service features are included in the Marengo, Iowa, board:

1—Machine Ringing—Makes a call that must be answered.

2—Keyless Listening — Rapid answering.

3—Register Peg Count—Operators get credit for every call answered.

4—Secret Service — Operator cannot hear conversations.

5—Traffic Distribution—All calls for all operators.

6—Instantaneous Recall—Each call of every subscriber a positive signal immediately answered.

7—Revertive Ringing Tone—You hear the party called being rung.

8—Instantaneous Disconnect — Every subscriber's line a two-way trunk.

9—Ringing Control—When you hang up the called bell stops ringing.

10—Dark Keyshelf—Light on the keyshelf has a definite meaning.

Mr. Phillips has met with situations most discouraging, but has stuck on the job, and now his subscribers are boosting the service and his exchange.

The Marengo telephone building is another illustration of the adaptability of Kellogg apparatus. Up to the time of occupancy by the telephone company, this building was a private residence. With very little alteration, however, Mr. Phillips has a most attractive layout on the ground floor, which includes all his departments.

There is a long hallway on the left side of the building. On entering, there isa business window immediately at the right. Behind this window, the bookkeeper, who is also chief operator, can handle new accounts and the payment of bills with dispatch. The switchboard is installed parallel to the opposite wall, and there is ample room behind the board with plenty of light afforded by a large window.

Continuing a step further down the hall, we enter Mr. Phillip's office. Going back to the entrance we find on the left a most excellent battery room with the cells in apple-pie order, mounted on a concrete base with proper sand surface.

Next to the manager's office is the terminal room which is large, and extends across the building. Near the door of this department are two toll booths with an outside window which is rather unusual and certainly very desirable. Besides the entrance to the terminal room from the hallway, a door opens on the alley where there is plenty of room to park the company truck and motorcycle.

OPPOSE FUND.

Oklahoma Utilities Object to Depreciation Reserve Separation.

Oklahoma City, Okla.—The proposal of the corporation commission to require all public service corporations in the state to set aside a depreciation reserve fund met with united opposition from the owners and managers of public utilities, at a hearing before the owners and managers of public utilities, at a hearing before the commission on June 21. The commission reserved a final decision on the matter.

The hearing was on proposed order No. 168, which if finally approved by the commission, would compel each utility and other public service corporation, to set aside a cash fund to cover depreciation of its property and prohibit it from paying out in excess of six percent dividends until this depreciation reserve fund was created. The proposed order throws several restrictions around the fund one of which permits the company or corporation to borrow not to exceed 60 percent of the cost of any new construction from the fund and then for a period of only three years. The utility would be required to deposit, as security for all money borrowed from such fund, its own bonds or notes bearing interest at not less than 5 percent per annum the interest to accrue to the fund.

One fundamental objection to the proposed order was that it departs from the realm of regulation of rates and practices of public service corporations and assumes to regulate the actual handling and expenditure of funds of the companies, invading the territory of management. Attorneys, who argued the matter before the commission, declared that the courts have almost universally held that state commissions can regulate the rates and service of utilities but cannot substitute state regulations for functions properly belonging to the board of directors.

Utility men are not opposed to a depreciation book account and to being held accountable to the commission in connection with rate cases for the disposal of any depreciation allowed by the commission, if they are permitted to use the money represented for the best interests of the property and patrons.

The utility operators expressed themselves as in favor of regulation of their rates and matters affecting their service to the public but declared unanimously that if a corporation commission or any other governmental body were given power to direct the management of the company or to tie up its funds in such a manner as they could not be used in the business, they would be unable to finance a single improvement of service or extension of property.

Chairman Campbell Russell of the commission stated that the commission was seeking all information possible before issuing a final order. He explained that the purpose of the proposed order was to establish a guarantee that money provided for depreciation would be utilized for that purpose, and not paid out in dividends, while the property was allowed to run down.

Most of the utility men present declared that they now utilize all available funds to keep their properties in as near 100 percent condition as possible and do not desire to be penalized because occasionally there may be a poorly managed utility that does not do so.

TRUCKS IN SUMMER.

International Experts Advises on Methods of Getting 100 Per Cent on Hot Days.

New York, N. Y.—A. F. Masury, chief engineer of the International Motor Co., gives some valuable suggestions for preparing motor trucks for summer work. He says:

"The sweltering days of summer will soon be with us and service stations will again be filled with heat-afflicted motor trucks.

"Overheating and other common hot weather troubles are usually due to lack of forethought and to mistakes that can be easily avoided. The main points which require attention are briefly outlined below.

"1—Do you understand the truck's cooling system thoroughly? If not, now is the time to go over it carefully and find out all there is to know about it. See that the flow of water is not impeded by any sort of obstruction and that the overflow pipe is not bent below the level of the base of the radiator filler. Be sure that the overflow pipe is not clogged or flattened.

"2—Is the radiator clean? The front of the radiator should be free from dirt, license plates and signs. Also, the back of the radiator should be unobstructed so that nothing will impede the circulation of the air.

"3—Are the hose connections watertight and is the hose in good condition? Be sure that the rubber has not been affected during the winter by an antifreeze solution. Only the best quality rubber hose should be used, as the inside tubing of cheap hose is easily worn away and the rubber particles carried along with the water clog up the radiator.

"4—Does the fan turn freely and is the belt tension right? The fan should be clean and its bearings should be well greased. A good test is to turn the fan by hand with the engine shut off. If it is possible to slip the belt easily, but not possible to spin the fan, the tension is right.

"5—Is the carbureter choke in proper repair so that it opens all the way? Better open the seasonal shutter on the hot-air tube. Is the float level correct? If too high, slight flooding will cause an overrich mixture.

"6—Does the ignition system furnish a spark of sufficient strength? A weak spark due to excessive lubrication of the magneto, dirty breaker or distributer, or weak magnets, will have an effect similar to late spark timing and overheating will result.

"7—Are the valve tappets properly adjusted? They should have from .008 to 0.10 inch clearance, which may be gauged by about the thickness of an ordinary postcard.

"8—Are the cylinders free from carbon? If not, remove it.

"9—Is the oil in the crankcase clean? Gasoline, dirt, or other foreign substances will impair the quality of the oil in the crankcase resulting in overheated parts due to insufficient lubrication. The oil reservoir should be drained every 1,500 miles, the walls thoroughly cleaned, and a fresh supply of oil should then be put into the crankcase.

"10—Are you using the right grade of oil? Because of the increased temperatures it is often advisable in summer to use a heavier grade of oil than in winter.

"11—Are the exhaust pipe and muffler clean? Practically 40 percent of the heat of combustion escapes through the exhaust. It follows, therefore, that if any part of the exhaust system is obstructed, a part of this heat must be carried off by the cooling water, which will naturally raise its temperature.

"12—Are the brakes free? A dragging brake will cause overheating in hot weather that might not occur in cool weather."

Grand Rapids Asks 10 Per Cent on Delayed Payments.

Grand Rapids, Mich.—Because the Citizens' Telephone company does not want to have to effect a general increase in rates it is asking for the right to put a 10 per cent penalty on overdue bills.

Depreciation Facts Given

United States Independent Telephone Association Gives Interstate Commerce Commission Its Ideas On Best Way of Depreciable Property Accounting

Washington, D. C.—Classification of depreciable property by groups, methods of ascertaining service life and salvage value, bases upon which depreciation charges should be accrued, the necessity for accruals, relation of maintenance charges to depreciation, and the manner in which percentages of depreciation applicable to the several classes of property should be determined, are covered in the report the United States Independent Telephone Association has submitted to the Interstate Commerce Commission at the latter's request.

In order that the statement may fully and accurately represent the thought of the industry, the Independent Association invites comments on it.

"While this statement has received the attention of all of the members of the executive committee, it is mainly the work of Messrs. C. B. Randall, secretary, The Tri-State Telephone and Telegraph company, St. Paul, Minn., and H. L. Harris, vice-president, Kansas City Telephone company, Kansas City, Mo. Mr. Randall and Mr. Harris have devoted much time and thought to this statement and deserve the appreciation and thanks of all members of the Association for the very valuable work they have done. No subject that has in recent years been a matter for consideration by the Association has been given more careful study than has been given by the executive committee to this question."

The Independent report follows:

Early in its investigation the executive committee decided to discuss these questions under the following eight

1. Peculiarities of the telephone business, necessitating treatment different from that of other carriers.
2. What the reserve is for:
   - A. Theory.
   - B. What to cover.
3. How the reserve is to be accumulated.
4. How the unused balance is to be handled.
5. What classes of property require a reserve.
6. Method of ascertainment of amount per class.
7. The method of application of the results to individual companies or to localities.
8. General suggestions.

The Association, therefore, through its executive committee, having given due consideration to the subject, sets forth its views herein, taking up each question in order.

1. PECULIARITIES OF THE TELEPHONE BUSINESS,

Necessitating Treatment Different from That of Other Carriers.

(a) The telephone business is peculiar in that all of the property involved in its business, other than land, is of a nature that deteriorates with age, much of it is of relatively short life, and in general and outside of land, buildings, and underground structures, there are few items that would, in the ordinary sense, be classed as permanently invested property.

(b) In the telephone business a large portion of property is made up of central office and substation equipment which, owing to the intricate and highly technical nature of the business, is more or less fragile in character and construction. These parts are subject to hard usage and are therefore of relatively short life as compared with the more substantial and rugged equipment used by other carriers.

(c) In the telephone business a large percentage of the property is located upon premises not under the control of the telephone company, such as public highways, streets, alleys, etc., and at all times therefore is subject to changing conditions affecting such public property, as well as by abutting private property requirements.

(d) A telephone company is the only utility that retains ownership and is required to place its property upon the premises of its individual patrons, and this company owned property so placed, is, by the very nature of the business, of a class having a relatively short life, necessitating frequent replacement.

(e) In no other utility business are the items of inadequacy and obsolescence so pronounced as in the telephone business. Constantly changing local community conditions, sudden and abnormal growth in subscribers, and many other unusual conditions that constantly arise, make necessary the retirement of otherwise useful plant, due to inadequacy, and require its replacement by larger and more adequate plant. The rapid changes in the art of telephony have, throughout the life of the industry, made the item of obsolescence a very considerable factor, and this obsolescence element is still operating and by the very nature of the business will continue to do so. It has been the experience of the telephone industry that fundamental changes in plant, equipment or methods, occasioned by the advancement of the art and made necessary by the increasing public requirements for telephone service, have taken place in cycles of 10 to 15 years; such as changing aerial wire to cable, aerial plant to underground, magneto central office equipment to central energy and then to automatic, etc. These changes have resulted in the wholesale replacement of otherwise useful plant or equipment, due solely to inadequate and obsolescence, and there is no reason at this time to believe that these changes will, in any appreciable way, be lessened in the future.

2. WHAT THE RESERVE IS FOR.

A. Theory.

(a) Two theories have been advanced as to the purpose for which a depreciation reserve is accumulated. One, that, as property must be replaced, the entire cost of replacement in kind, whether greater or less than original cost, should be paid from the reserve. The other, that, as replacements are made, only the original cost of the property replaced should be borne by the reserve.

(b) The first theory seems impracticable and unwise for the reason that replacements are rarely made in kind, some other or different equipment or construction being necessary, and seldom, if ever, can a replacement be made at the same cost as the original, and past experience indicates that the cost of nearly all replacements is greater. The reserve if to be available, must be built up in advance of its requirements for use, and it is impossible to estimate with any degree of certainty what replacement costs are going to be. Therefore, working on this theory, there is no known basis, other than conjecture, upon which to base the annual charge to operating expense to build the reserve.

(c) The second theory, however, is tenable. It is susceptible of close ascertainment. It seems reasonable. It is supported by logic as well as court decisions.

(d) Investors are not primarily interested in property as such, but are interested in the investment, and, as property deteriorates in value regardless of cause, it is the loss in investment that appeals to the investor. Since practically all telephone property deteriorates with use, the U. S. Supreme Court has well said (as in the following language), that the owner need not see his property worn out in the service of the public without collecting in rates or revenue therefrom sufficient to offset such lessening in value.

> "Before coming to the question of profit at all, the company is entitled to earn a sufficient sum annually to provide not only for current repairs, but for making good the depreciation and replacing the parts of the property when they come to the end of their life. The company is not bound to see its property gradually waste without making provision out of earnings for its replace-

ment. It is entitled to see that, from earnings, the value of the property invested is kept unimpaired so that, at the end of any given term of years, the original investment remains as it was at the beginning."—Knoxville vs. Knoxville Water Co., 212 U. S. 1, 53 L. ed. 371.

(e) Under this plan it is apparent that the amounts necessary to be provided are known. Investment is cost. Cost is known as property is put into service and the total amount to be protected by the reserve is certain and definite. It therefore seems that a reasonable theory is that a reserve for depreciation is an insurance fund to protect investment and must therefore cover original cost in place, plus cost of removal—less salvage.

B. **What the Reserve Must Cover or Protect Against.**

What the reserve must cover are those items that from the beginning constantly operate to lessen the value of a telephone plant, namely: Physical Deterioration, Hazards and Unforeseen Emergencies, Inadequacy, and Obsolescence.

(a) **Physical Deterioration.**

Physical deterioration (depreciation in the strictest meaning of the word) is best defined as natural wear and tear resulting from use and the elements, viz., the rotting of poles, the rusting of iron wire, the wearing out of parts, etc. Experience has developed that there are no elements in a telephone plant, with the possible exception of land, which ultimately will not have deteriorated to a point where they must be replaced.

Deterioration occurs very rapidly in some types of property and very slowly in others. Therefore a reserve must be accumulated so, as these items are replaced, there will be adequate funds to provide for such replacement to the amount, at least ,of its original cost in place, plus cost of removal, less salvage.

(b) **Hazards and Unforeseen Emergencies.**

Large amounts of property are destroyed annually by fire, sleet, winds and storms generally—"Acts of God," as they are termed. All losses from these causes are chargeable to reserve.

It is clearly demonstrated how often and how unexpected, both as to time and amount these losses are. They are a very considerable factor in the necessity for a reserve.

(c) **Inadequacy.**

Inadequacy is that element in the telephone business where conditions resulting from increase in the business require replacement of otherwise useful plant and equipment by plant or equipment by plant or equipment of sufficient capacity.

A telephone company, in planning its plant, generally provides facilities for expected and future business. The amount of this expected business is determined from all the facts available, such as past growth; character and extent of the community served; prosperity of the inhabitants; whether of a telephone-using class; industries in the territory and their growth as having a bearing on increase in population, etc. After such data is accumulated, summarized estimates or projections are made and a plant of required capacity is installed. If, thereafter, a manufacturing plant or other similar enterprise be started in the district—this not having been foreseen—and as a result population increases, facilitates become inadequate and therefore require replacement. Again, as has often happened, the attitude of a community towards telephone service may change and many more persons require service than could reasonably have been expected.

These and other conditions cause inadequacy.

(d) **Obsolescence.**

One of the characteristics peculiar to the telephone business is the constant changes and improvements in the art. As a result very few parts are left in place until their "wearing value" has disappeared. New types of telephones have replaced older types. Improvements in switchboards have necessitated complete changes in central office equipment long before the useful life of the replaced equipment is exhausted. The ability to contain large numbers of wires in cables has caused open wires to be taken down and cables put in their place.

Again, state, county and municipal requirements cause an enormous removal of equipment, and this is likewise an obsolescence charge. As an example, a city determines to pave a street. The fact of paving alone demonstrates the importance of the street and, because of its importance, objection is made to poles with aerial wires or cables along the street. Despite the fact that many years of useful life remain in the poles, wires and cables, the telephone company is, however, required to remove them to a new location or replace with underground structures.

The states and counties are engaged at all times in rebuilding and changing the route or width of roads; many are being paved. In most cases the telephone company is called on to remove its property to another route or another location. This, while incidental to serving the public, is unnecessary from the strict viewpoint of continuing service. Therefore, such items as these must be anticipated in accumulating a reserve.

Often a community changes in character, such as a residential district changing to business, and as a result of such changes equipment and structures in use are no longer needed, and must be removed because of the discontinued demand for service. This is a common type of obsolescence loss.

Land: Depreciation or reduction in investment in lands is occasioned by either obsolescence or inadequacy.

Summary.

The experience of the telephone business generally has been that by far the greatest replacement of property has been occasioned by inadequacy and obsolescence. Very little of a telephone plant is permitted to wear out. It is torn down and replaced long before its useful life is exhausted because of these elements of inadequacy and obsolescence. Therefore, if the demands upon the reserve were made to meet losses caused by depreciation alone, the amount necessary could be computed easily with substantial accuracy. Since, however, the principal demand is occasioned by the two items of inadequacy and obsolescence, it is difficult to state mathematically just what must be provided and so it becomes a matter of judgment to be determined from facts which are discernible.

3. HOW THE RESERVE IS TO BE ACCUMULATED.

(a) The reserve can only be accumulated from revenues. There are three methods in general use for such accumulation; one known as the "straight line" method, one as the "sinking fund" method, and the other as the "replacement" method. These are so commonly known that further definition seems unnecessary. In general, the telephone companies seem to have adopted the straight line method, as this seems best applicable to the business, although some telephone companies have adopted and are using the sinking fund method. We believe, however, that very few telephone companies use the replacement method and those who do are doubtless of relatively small size. By this method there is involved considerable fluctuation in opearting costs with the resulting peaks in expenses, as replacements are made and charged thereto; therefore, this method seems undesirable as applied to the telephone business.

The use of either the straight line or sinking fund method, where either has been previously used, should be left optional with the individual companies, as by either method only the percentage rate and balance in the fund is affected. Under either method the amount of depreciation that would be paid by the public in rates would ultimately be the same, its application over the period, however, being the only difference.

(b) By either the straight line or the sinking fund method the reserve should be set up in annual additions to the fund from revenues. The generally adopted method is by equal monthly installments which tends to spread the charge evenly over the operating statements and therefore prevents undesirable peaks in operating costs.

4. HOW THE UNUSED BALANCE IS TO BE HANDLED.

(a) The telephone using public pays telephone rates for service rendered and part of that cost of service is neces-

Fix the Weather Man—He's Rate Maker.

Who ever heard of an irate subscriber jumping on the weather man? But look what burdens the telephone man has to carry in his rates because of storms:

One Illinois storm cost the Illinois Bell alone $500,000.

The Mountain States T. & T. was "knicked" for $105,000 on toll circuits alone by one "Big Snow."

Even King Canute couldn't command the elements. Let's see what the "master minds" who kick about telephone rates can do.

sarily, by the very nature of the business, deferred, and a depreciation fund is therefore necessary to meet this deferred cost due to depletion of capital. Upon payment for service by the public, the money becomes the property of the telephone company and as such its use thereafter is a question of management, subject to the company's obligation to render at all times reasonably adequate service.

(b) Section 20 of the Interstate Commerce Act gives power to the commission to fix the amount of reserve which shall be accumulated and how it is to be accumulated, but it apparently does not authorize how balances existing from time to time shall be used.

5. WHAT CLASSES OF PROPERTY REQUIRE A RESERVE.

(a) There is an appreciable difference between telephone property and the property of railroads and other carriers. This difference has been outlined previously under "Peculiarities of the Telephone Business," etc. There is likewise a difference between the telephone properties of the various classes (considering such properties classed on the basis of size or population of area served). Local community conditions, climatic conditions due to geographical location, and general character of the plant are controlling elements in the matter of depreciation. Also the different elements that go to make up a telephone plant are subject to depreciation in a greater or less degree and the probable rate of depreciation as applying to these several classes of plant, likewise varies, as stated above, for plants as a whole, that is, as to the general character of the plant, location and extent of the community served, etc.

(b) There are no classes of telephone property for which a reserve is not necessary, since all classes are susceptible to depreciation in either one respect or another, with the possible exception of land. While lands ordinarily are considered as free from depreciation, the fact remains, however, that with many companies obsolescence or inadequacy causes a depletion of investment in land.

6. METHOD OF ASCERTAINMENT OF AMOUNT PER CLASS.

(a) It is taken for granted because of the entire dissimilarity of telephone properties from those of other carriers that the law contemplates the consideration of depreciation as to telephone companies entirely aside and apart from the question as applied to railroads and other carriers, and that telephone properties are to be classed by themselves.

(b) As just stated each telephone property is in a class by itself due to size, character, geographical location, area covered and extent of community served, and theerfore requires individual treatment.

(c) The rate of depreciation must consider each class of property as defined by the Uniform System of Accounts as prescribed for telephone companies by the Commission.

(d) In general, this question must necessarily be considered with the answer to the next question, viz., the method of application of the results to individual companies or localities. Therefore this article will deal with the individual company, and other phases will be considered in connection with question seven.

(e) Since the depreciation reserve is fo rthe purpose of protecting investment as suggested hereinbefore, therefore ,the first premise is established: the total amount that is to be raised. The second premise is: that the charges to operating expense for the purpose of this reserve must be spread equally over the years in which the required amount is to be raised in order that the charge may be spread evenly throughout the period.

(f) With these two premises established, that is, amount to be raised, and that it shall be raised in annual installments, there remains only the third essential—over what period shall the fund be accumulated? Since service should be maintained and investment protected, and only the amount necessary to care for these elements be raised, the time is necessarily that period which will elapse before investment is retired by wearing out, removal or abandonment of the property involved.

(g) The life of the investment must then be determined. Since it is apparent that the several classes of property in a telephone plant have varying lengths of life, it follows that the life expectancy as to each class of property must be ascertained. The investment in each class is known or can be determined, and this investment per class plus cost of removal less salvage, divided by life in years of that class will give the annual percentage of cost, which, each year, must be set up in reserve as to this class. By averaging the several classes the composite percentage for the property as a whole can then be ascertained.

(h) In the determination of life expectancy of the various classes, the minimum life expectancy rather than the maximum must be taken, for the interest of the telephone company, deterest of the telephone company, demands that this fund always be adequate, otherwise replacements and changes cannot be made and a failure of service to the public will result.

(i) If the reserve should be inadequate when demand occurs, it is then too late to remedy the situation. Relief can hardly be retroactive. If, on the other hand, the reserve, in the light of estimated future experience, is too great, the amount can be reduced by lessening temporarily the annual charges. The history of state commission regulation indicates that in the past telephone companies have set up inadequate reserves and that the public has suffered because thereof. The fact that the public has this interest seems evident by the passage of this law by Congress and is an evidence of the public demand that hereafter the charge shall be adequate.

(j) The reserve is part of the cost of furnishing service. It insures to the public a plant capable of furnishing reasonably adequate service. It insures to the investor and owner that the public is not destroying the investment while using it. Hence, both the public and the company are interested in seeing that this account is sufficiently large. It is easy to correct an error resulting in too great a reserve without loss to the public, or t th: company. It is difficult and costly to correct, both for the public and company, if the reserve is insufficient.

(k) Cost, less salvage, plus cost of removal, divided by life in years, equals percent of annual charge.

7. METHOD OF APPLICATION TO INDIVIDUAL COMPANIES AND LOCATION.

(a) In dealing nationally with the question of depreciation as applied to telephone companies, we are at once met with the fact that conditions differ not only in different states, but in different parts of the same state, and between adjoining operating companies. Obsolescence varies according to the rapidity of growth in population. Hazards vary according to geographical location. Deterioration occurs rapidly or slowly according to climatic and soil conditions. It is at once apparent, therefore, that no answer can be given applying to the country as a whole, or by states, or by companies, when such companies have several exchange properties.

(b) In the ascertainment of a proper reserve for depreciation, it seems therefore evident that companies must be considered individually, rather than collectively, or by groups. However, as it is probably out of the question for the commission to consider each individual company it would seem then that some easily workable plan should be adopted whereby each company should be allowed to establish its own rate of depreciation within certain limits prescribed by the commission. Such a plan, utilizing the straight line method, is outlined in the following:

(1) That the commission establish a minimum and maximum allowable rate for depreciation based upon experience, and it would seem for a beginning that a minimum of 4 percent and a maximum of 8 percent would be reasonable.

(2) That each individual company by approval of its board of directors should be allowed to set up, from time to time, its rate of depreciation at some point between these two figures, in the manner hereinbefore suggested. Such rate so approved should then be filed with the Interstate Commerce Commission together with a resume of the facts upon which such rate is based or computed, and unless within 30 days stayed by order of the commission, should theerupon become effective and remain in effect until changed by approval or order of the commission. Any company should have the right to petition the commission for permission to establish a rate higher or lower than the prescribed maximum or minimum and, where the facts warrant, specific order should be entered permitting the same.

(c) Should the commission establish a minimum and maximum schedule of rates for depreciation as above, probably there would be many companies who, due to insufficient plant records or by reason of previous accounting practices or lack of sufficient revenues, would find it difficult, if not impossible, to set up immediately a rate for depreciation even as low as 4 percent without seriously affecting their financial positions. Some companies would undoubtedly show a loss from operation which would be immediately reflected in their statements and the resulting effect such a loss might have upon banking credit and investors might likewise be reflected in their serv-

ice to the public and result in a general detriment to their business.

(d) Any order of the commission establishing such a scale of rates for depreciation should be sufficiently elastic so that any company may, where conditions warrant and with the approval of the commission, set up a lower rate than 4 percent for a minimum period of, say, two or three years, in order that such company may have sufficient time to regulate its practices or secure from local rate-making bodies rates sufficient to enable it to set aside from its net earnings the minimum allowable rate for depreciation; and when such company by the readjustment of its practices or the securing of additional revenue is enabled to set aside from its net earnings the minimum rates at any time before the expiration of the two or three year minimum period, it should be required to do so.

(e) The above suggestion as to a minimum and maximum scale of rates for depreciation is made with the consideration that a minimum composite rate of 4 percent is probably too low a rate for any telephone property. The thought, however, in establishing this low minimum is to give those companies who are not now setting up even so low a rate for depreciation as 4 percent an opportunity to get their property in condition to earn the proper rate, and likewise to give the local regualtory bodies an opportunity to assist in this necessary procedure.

(f) After a proper percentage for depreciation as applying to an individual property has been ascertained in the manner hereinbefore suggested, this amount, being an operating expense, should be charged off monthly, preferably on a uniform allocation basis so as to maintain the operating expense on a reasonable level month by month, and without excess fluctuations.

(g) Naturally there are companies whose records are such as to afford no reliable data, in which cases the records of the nearest available company of like character might be used and modified as the affected company's experience may indicate.

8. *GENERAL SUGGESTIONS.*

(a) The association wishes to call the attention of the commission to the fact that a majority of its member companies are now setting up a reserve for depreciation by either of the generally accepted methods and in the manner provided by and under the provisions and latitude of the "Uniform System of Accounts" prescribed by the commission, effective Jan. 1, 1913.

However, while many companies at this time may be setting up a reserve for depreciation that is adequate there may be other member companies who have not been setting up a sufficient amount in reserve. The leeway given companies under the general provisions of the "Uniform System of Accounts" makes these conditions possible. Where inadequate reserves are being set up, it may be due to a number of causes such as insufficient revenue, incorrect composite percentage rate, too low a rate as ordered by state or local regulatory bodies, etc. Therefore, in the event of any change as to classification of property or methods of obtaining and applying depreciation, or differentiating the practices as previously set forth by the "Uniform System of Accounts," companies should be given sufficient time to readjust their methods or practices or to secure additional revenue, etc., in order that such changes may be met.

(b) There may be some companies who have not been regularly setting up a reserve for depreciation but have been taking care of the items ordinarily and properly chargeable to depreciation through their current maintenance account. Any companies following this practice, however, are, we believe, few in number and relatively small as to size. A reasonable time will be needed for such companies to establish the proper accounting practices and do all other things necessary to comply with the orders of the commission.

(c) It would seem that the problem of determining proper rules for telephone to follow in providing for adequate depreciation charges would be very much simplified for both the commission and the companies, as well as more apt to be viewed with favorable consideration by other regulatory bodies, if, instead of attempting to fix rate for depreciation on a definite percent per company per year basis, a minimum and maximum percentage be established as hereinbefore suggested which readily could be made applicable to any specific telephone property, regardless of size, character, community conditions, geographical location, and if, after such minimum and maximum percentage were established, individual companies be permitted to establish their own rate for depreciation within the limits prescribed and subject to the approvals and regulations as hereinbefore suggested.

U. S. INDEPENDENT TELEPHONE ASSOCIATION.

By

F. B. MacKINNON,
President U. S. Indepednent Telephone Association, Chicago, Ill., chairman.

W. G. BROREIN,
President of Peninsular Telephone Company, Tampa, Fla.

H. L. GARY,
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L. E. HURTZ,
Vice-president Lincoln Telephone & Telegraph Company, Lincoln, Neb.

C. Y. McVEY,
President Ohio State Telephone Company, Columbus, Ohio.

H. L. REBER,
President Kinloch Telephone Company, St. Louis, Mo.

G. W. ROBINSON,
President The Tri-State Telephone & Telegraph Co., St. Paul, Minn.

EXECUTIVE COMMITTEE.

NEED COMMISSION O. K.

Ohio Supreme Court Rules Mutual Companies Must Have Util. Com. Regulation.

Columbus, Ohio.—Farmers' mutual telephone companies may not be established except on approval of the public utilities commission, according to an Ohio Supreme Court decision.

Reversing two courts of appeals, the Supreme Court held that mutual telephone companies, even if they profess to be operating "not for profit," must obtain from the utilities commission certificates of necessity before they may enter a community.

The Union Center Mutual Telephone association had obtained a franchise to operate in Mendon, Mercer county, and applied for a franchise to the county commissioners, when the Celina and Mercer County Telephone company brought injunction proceedings against it. The defendant contended the Celina company wasn't giving adequate service and that under a section of the public utilities law exempting non profit concerns, it did not have to get a certificate of necessity, citing a ruling of the utilities commission as authority.

Common pleas court denied the injunction and the court of appeals affirmed.

Opinion Not Unanimous.

The supreme court opinion, written by Judge Hough and concurred in by Judges Robinson, Jones and Matthias, held that the test as to whether it is an association not for profit is to be determined not by its own statement in its incorporation papers, but by the "character of business and method of conducting it."

Judge Wanamaker wrote a dissenting opinion. Chief Justice Marshall and Judge Johnson are not on record.

The same question was raised in the case of the Local Telephone company to enjoin the Cranberry Mutual Telephone company from operating in New Washington, Crawford county, in which the defendant cited an additional defense on the ground that New Washington is a home-rule village.

The supreme court, by the same majority as in the other case, held that home-rule municipalities have no power to give franchises to telephone companies which do not first obtain certificates of necessity. Johnson and Wanamaker wrote dissenting opinions.

Pushing A Submarine Cable

English Scheme for Getting Cable Under River Without Digging Crowned With Success Despite Unfavorable Soil Conditions—Bore Placing

London, Eng.—In carrying out the scheme of running the cables from the New Broadway Telephone Exchange on the south side of Jupp-road, in Stratford, London, E., it was necessary to cross the Channel Sea River in some manner, and to form accommodation for nine cables, each roughly consisting of 800 pairs of wires. The Channel Sea River is a tidal tributary of the Lea, and comes under the control of the Lea Conservancy. The proposal was that, immediately on leaving the exchange—a nine-way duct should be laid below the south footpath in Jupp-road to the barrier at the end. The cables were then to be taken over or under the Channel Sea River and under the permanent way of the Great Eastern Railway at the junction adjacent to Stratford main station on the Woolwich branch, the river at the point of crossing being 38 feet wide.

According to the Engineer of London, whose interesting article and illustrations are herewith reproduced, the following alternative schemes were considered for the river crossing:

(1) A reinforced concrete bridge carrying nine steel tubes.

(2) Damming the river in sections and burying the standard bitumen jointed nine-way duct at a depth of 6 feet or 7 feet below the river bed.

(3) Laying the nine steel tubes by the Mangnall-Irving thrust borer below the river, between shafts sunk one in Jupp-road and other on the narrow bank between the river and the railway.

It was decided to make the crossing by the last-mentioned method, and the contract was undertaken by the Hydraulic Engineering Company, Limited, of Chester and London, the sole licensees in this country for the Mangnall-Irving thrust borer, and the operations were carried out under the direction of Capt. A. R. Mangnall, A. M. Inst. C. E., A. M. I. Mech. E.

The shafts were sunk in the position shown—No. 1 and No. 2 in Fig. 1. It had been anticipated that blue London clay would be encountered almost immediately. That, however, was found not to be the case The first 14 feet 6 inches proved to be made up ground consisting of loam, sandy clay and stones, while the next 5 feet were running sand and ballast. This seam of ballast was passed at 19 feet in No. 1 shaft and 17 feet in No. 2. Below it a blue grey marsh clay continued for 5 feet to 6 feet, and below the clay there was more wet yellow sand. It was originally intended that the borings should be made between 15 feet and 18 feet down, but owing to the ballast it was decided to go deeper; the borings were actually carried out between the depths of 19 feet and 23 feet down, so that the ducts might all be in the seam of marsh clay just mentioned. It would, of course, have been possible to make the borings in the made-up ground above the ballast, but if that had been done there would not have been sufficient depth of overlying soil to give the clearance below the bed of the river specified by the authorities, so as to allow for future dredging and deepening. Both the vertical shafts were close timbered and heavily strutted, and owing to the presence of a considerable amount of water, particularly in No. 1, the Jupp-road shaft, pumps had to be kept going night and day during the operations. Beyond a 12-inch sewer near the surface and the rear face of No. 1 shaft, no obstacles were met with during the excavation.

The section of ground available for boring the nine holes and laying the cable tubes was approximately 4 feet in depth by 3 feet wide. Now, although it is a comparatively simple operation to make a single thrust-boring in that space, it is a difficult task to crowd together nine holes into so small an area. In thrust boring, the holes are made by the displacement and compression of the surrounding earth, there being no cutting action, and consequently no spoil. The effect is that any boring made closely adjacent to another tends to pull over to the boring previously completed. A special device to enable a number of bores—in this case three—to be made side by side and parallel to one another with only 2 inches of earth between each, was designed, and the nine tubes were to be laid in three horizontal tiers of three tubes each, being spaced vertically on 18-inch centers. The proposed sequence of operations was first to make the center boring and then to pass through the ground and the device for forming two further bores, one on each side of the first bore. The first pilot boring was made successfully. The timbers were then drawn slightly to permit the of the passage of the multiple hole-boring device. The poor character and water-logged state of the marsh clay was then fully apparent, as both faces collapsed and continued to break away and fall out through the aperture where the timbers had been raised, in a pulverized form like wet sand. The timbers were, accordingly, quickly driven back into position and the damaged faces packed as much as possible to prevent further collapse behind them, because the belt of running sand and ballast started to find its way through, and the river was in very close proximity at

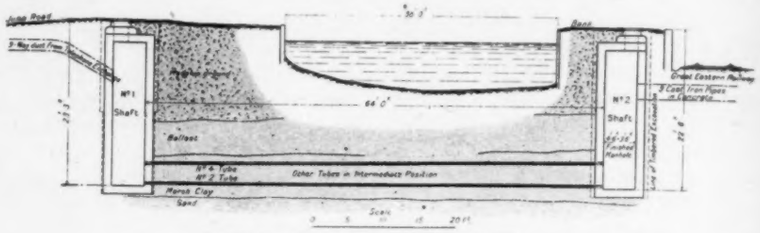


Fig. 1. Cross Section Through Site.

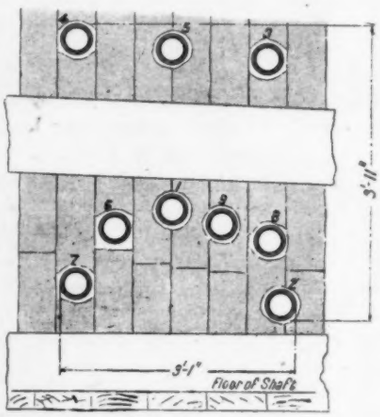


Fig. 2. Position of Tubes.

No. 2 shaft. In view of this failure, the idea of making the holes in series of three was abandoned, and each boring was made independently through 6-inch holes drilled in the timbers. The work by the latter method was not so simple or so rapid, but further collapse of the faces was prevented since the timbers were not again disturbed. The actual positions of the bores as they were finally made in shaft No. 2 is shown in Fig. 2.

The first two borings were made from the No. 1 shaft, the operation in each case being first to make a 4-inch diameter thrust boring, then to withdraw the boring tubes, then to increase by a second operation the 4-inch bore to 5½-inches, and on withdrawing the larger boring tubes to attach the first cable tube to the end of the boring tube at No. 2 pit, so that all the cable tubes were pulled into the completed bore as the boring tubes were withdrawn to No. 1 pit. The load required to pull in the cable tubes was found to be very high owing to the collapsed ground at the faces being dragged into the bore by the tubes and causing excessive friction, and the ordinary maximum working pressure of one ton per square inch of the plant was exceeded. In view of this, the boring plant was transferred to No. 2 shaft, which, as it was slightly wider, permitted the cable tubes to be driven into the ground by a larger diameter boring cylinder, and the secondary operation of increasing the first bore from 4-inch to 5½-inch diameter was performed by driving the auxiliary pilot ahead of the cable tubes as the latter were being driven forward. The cable tubes were of 3½-inch internal diameter, and were in 6-foot lengths and screw-coupled, the diameter over the coupling being 4¼-inch. The nine tubes were laid at the rate of one per day. On completion of the laying of the tubes the two shafts were to be bricked up to form permanent manholes, having a concrete base and roof. Beyond the brickwork a band of puddled clay was to be formed as the timbers were withdrawn.

The successful carrying out of this undertaking forms a distinct advance upon existing methods, and as the work was done under exceptionally difficult ground conditions, it suggests a very simple future application to those cases where reasonable ground strata is encountered. River crossings as great as 700 feet to 900 feet are being actively considered. The operation of thrust boring is limited to ground of a clay nature, although not necessarily pure clay; chalk, concrete, etc., cannot be thrust-bored.

SNAPPY WORK.

Topeka, Kan., Trouble Shooters Restore Service P. D. Q. Following Fire.

Topeka, Kan.—H. D. Livers, plant superintendent of the Southwestern Bell Telephone company, has had all his claims for the speed and worthy calibre of his trouble shooting force confirmed.

Following a switchboard fire which was prevented from gutting the exchange by the heroism of A. J. Conway, testboardman, Topeka's telephone service looked to be in for a long interruption. Perfectly co-ordinated work re-established complete service in 28 hours.

The fire was first noticed by the chief operator at 1:12 p. m. when smoke was seen issuing from the answering jacks on panel 9. She called the central office repairman by telephone. He at once started along the switchboard and as he passed back of position No. 1 noticed smoke issuing from the cable holes in the board. He raised the roller curtain of this section and found the fire had already made considerable headway. The flames were rising from the multiple in panel 9 and were juse beginning to catch the woodwork in the roof. One Chicago fire extinguisher and several scoops of sand were used at this time. This greatly retarded the fire and saved the board from total loss.

A. J. Conway, testboardman, showed considerable bravery and presence of mind. He located the first and by use of the extinguishers as they were handed to him succeeded in confining the fire to three panels. By this time the plant superintendent arrived and aided and directed the men in planning and executing the temporary repair job.

The Repair Program

When it was found that the switchboard was entirely out of service the traffic employees were dismissed.

Only battery fuses which were affected by the fire were removed, leaving the toll board, Morse service and the P. B. X.'s in the city in service. Temporary repairs were at once started by the plant department. The multiple jacks were removed from the burned multiple skinners and the wires were spliced through. This re-established the continuity of the multiple and removed the damaged jacks from service. It was necessary to do this in panel 9 and part of the adjacent panels on either side. The multiple damaged by the water was raised by wedges and electric fans and electric stoves were provided and placed in advantageous positions so that the multiple and other equipment damaged by the water could be dried. There were about 16,00 splices to be made besides the numerous other things to be done such as procuring the fans, heaters, stringing extra electric light circuits, etc.

In the meantime six telephone circuits from the commercial office to the toll board were connected. Also pay-station service from the hotels, depots, newspapers and State House were established to the toll board. Later in the evening, trunks between the toll board and the cut-off board in the terminal room were built up and the traffic department were then able to complete all incoming toll calls to the Topeka subscribers.

By 6 a. m. the following morning 5,200 multiple had been spliced and were ready to turn over to the traffic department. The traffic department started to give service at 8 a. m. to 5,500 subscribers. Complete temporary service was ing a total of 28 hours between the completed at 5 p. m. on the 16th, maktime of the fire and the re-establishing of complete service.

The switchboard was a 10,000 line American Electric, two-wire common battery switchboard, 40 positions, 6,000 lines and approximately 14,000 stations. On account of the limited space in which the restoration work had to be performed it was necessary to work the repairmen in relays and the workmen went merrily to their task, and before the subscribers had fully realized that they were without telephones, service was again restored. Permanent repairs will be started in a very short time and rushed to completion.

While Mr. Conway, who was more or less seriously burned, and whose clothes were afire during his fire fighting, and whose lungs were seriously affected by the fumes of the fire and chemicals, was the hero, it must be said of the entire Topeka telephone force that one and all did some of the best restoration work that could be done.

The girls of the traffic department stayed at their positions at the switchboard while the fire was raging and while the fire was being extinguished and never left their positions until the main fuses were pulled in the terminal room and then only when the gong signal for the fire drill was sounded by the chief operator, Miss Downs, when they left the building in perfect order.

Operators' Safety Drive to Lay Low High Heels.

Oklahoma City, Okla.—As a result of a 12-month close watch of accidents to operators, officials of the Southwestern Bell Telephone Company are conducting a campaign against the high-heel menace.

Indiana's Best North Meet

Lake Wawasee Session Interesting and Valuable to Big Attendance—Purdue University Announces Mail Course for Plant Men—Operator's School

By Staff Correspondent

Lake Wawasee, Ind.—The meeting of the Northern Indiana Telephone Association held here June 14, 15 and 16 brought about the realization of the old motto:

"Good, better, best,
Never let it rest,
Until the good is better
And the better best."

The Northern Indiana Telephone association has been holding conventions for a number of years, but neevr have they had a more delightful time than at Lake Wawasee. The weather was ideal; the South Shore Inn where the convention was held and all accommodations provided is delightfully located on the bank of the lake; the building and the equipment are new, and the service throughout was exceptionally good.

Members and friends of the association began arriving Monday and when President Frank V. Newban, general manager of the La Porte Telephone Co., La Porte, Ind., called the meeting to order at 8 o'clock Tuesday evening, there were perhaps 150 people assembled to hear the Honorable Henry A. Barnhart, president of the Rochester Telephone company, Rochester, Ind., and also president of the Indiana Telephone association, give his popular lecture on "Congress in Action." Mr. Barnhart's address was most favorably received and enjoyed.

Get Well Acquainted.

The next stunt was to get acquainted. H. W. Hogue of Indianapolis, chairman of the social committee, introduced a number of ideas which brought about the desired results. The hotel orchestra had been secured and the music began to compel those in attendance to dance. The remarkable thing about the evening meeting was the fact that anyone entered into the spirit of the occasion and did their best to get acquainted. Whether they could or could not dance seemingly made no difference. All did their best and had a good time as one could tell by the smiles. One of the features of the evening was the execution of "turkey in the straw" by Congressman Barnhart.

Announce Purdue Mail Study.

Wednesday morning, President Newman called the men together on the big veranda where a most interesting session was held. Professor R. V. Achatz led the discussion and along with other things announced that the Purdue University had arranged a correspondence course which will enable beginners in the plant department to obtain a comprehensive knowledge of telephone troubles and their causes. The association is greatly interested in this correspondence course of the university, realizing that it will work to the mutual advantage of both the telephone employe and the telephone company.

Chance to Recover; All That's Asked.

"The average increase in utility rates during the past four years was substantially less than the average increase in the prices of the necessities of life.

"During the past four years most utilities have earned less than a fair return upon their invested capital, and equity would seem to require that during the next few years of downgrade prices, utility companies should be permitted to recoup reasonable losses offered in the period of up-grade prices.

"Utility rates were not, and are not now, based on the peak of war and post-war operating costs and therefore a considerable reduction in commodity prices can occur before the average of prices generally reaches the point on which utility rates, generally speaking, are now based. The welfare of the state and the country calls for a broad and sympathetic understanding of these important facts which should be of basic importance in the formation of regulatory policies."

PAUL P. HAYNES,
Indiana Public Service Commission.

Max Hosea, secretary of the state association, addressed the meeting on the value of asosciation work. Sam Tomlinson of Plymouth discussed relative costs of present-day operations compared with costs of the past five years.

The round-table discussions were in charge of Manager Troyer of the Home Telephone company, Elkhart, Ind. High tension lines affecting telephone service, the construction of phantom circuits, cost of maintenance and the upkeep of automobiles were some of the subjects discussed.

The law passed by the last legislature, limiting working hours of employes under 18 years of age to 48 hours per week and not more than 8 hours in one day and prohibiting the employing of these persons before 6 a. m. or after 7 p. m. was thoroughly discussed. It was stated that the additional cost due to the effect under this law would increase the operating expense of the smaller companies so that they would be compelled to obtain higher rates for their service or have to limit the service after 7 p. m.

On Wednesday evening, after a boating party around Lake Wawasee, the convention members enjoyed another dancing party.

Urge Accounting Uniformity.

Thursday morning Judge J. Clark of Danville, Ind., counsel for the Indiana Telephone association and former member of the Public Service commission, gave a most interesting discussion, during which he stated that telephone rates were about as high as they were going to go, that while there were a few companies who had to have more revenue and would get it, still there is a general feeling that this is not the time for the companies generally to make application for an increase in rates. The judge predicted the next movement would be initiated by the telephone subscriber, who would make application for a reduction in the existing rates and that the telephone company would be compelled to prove justification for any rate they were enjoying. He urged all companies to use the commission's uniform accounting system.

W. S. Vivian of the Automatic Electric company delivered a paper on "Why the Automatic Will Solve the Operator Problem.' Before starting to discuss his subject, Mr. Vivian gave it as his opinion that if the telephone company was to retain their present rates or secure higher rates, it depended largely on whether or not the telephone company would go to the effort and expense to

thoroughly educate the personnel of the telephone company, the operators, clerks, linemen or other employes. If, Mr. Vivian said, the companies will undertake such an educational program, the influence of the employes throughout the community will be sufficiently large to direct and control public sentiment. If the employes are thoroughly informed, they will be able to sell the telephone company's service to the community on a remunerative basis.

"Ninety percent of all troubles are caused by misunderstandings," someone said and only by means of educational programs can these misunderstandings be eliminated between the public and the company.

Bohn on Relations.

Frank E. Bohn, general manager of the Home Telephone & Telegraph Co., Fort Wayne, Ind., was next introduced and in his usual forceful manner he gave a splendid address on "Public Relations." He explained his company's policy in dealing with both employes and public. Mr. Bohn showed by numerous illustrations the benefits that was accruing to his company, not only in increased efficiency of the employes but also in their increased influence and power in the community. Mr. Bohn said he had seen the public relations of a company completely changed within a two-year period. He urged that members of the association should take the personnel of their respective organizations into their confidence and discuss with them the problems of the telephone company, so that when the company is attacked by the public, the employes can immediately come to the defense of the company.

H. L. Shoots of Goshen led the discussion regarding local and state taxation of utilities. J. W. Scott af Warsaw, the retiring secretary, showed by his reports that the association had had a very prosperous year.

New Officers.

The report of the nominating committee was given by Walter J. Uhl of Logansport and the following officers were elected:

President—Frank V. Newman, general manager, La Porte Telephone company.

Vice-president—Harry Phend, general manager, Milford Telephone company.

Secretary-treasurer — W. H. Van Horne, general manager, Wabash Telephone company.

Directors—S. Tomlinson, president of Plymouth Telephone company; C. R. Stoops, general manager, Nappanee Telephone company.

Chairman, Auditing Committee—R. O. Dorland, secretary, La Porte Telephone company.

Both Mr. Shoots of Goshen and Mr. Barnhart of Rochester extended invitations for the associations to hold their next convention with them. The question as to where the convention would be held was referred to the board of directors with full power to act. The convention passed a resolution extending their thanks to Manager Miller of Syracuse and his wife, for the splendid help they had rendered in making the convention a success.

Operators' School.

While the men were holding their meeting on the veranda, some fifty young women from telephone offices throughout Northern Indiana were gathered in the ladies' parlor where Miss Mabelle Cavanaugh, traffic superintendent of the La Porte Telephone company was conducting a operators' school.

The method of conducting the operators' school was unique. From an educational point of view, it afforded an unusual opportunity for those in attendance to discuss operating problems. President Newman of the La Porte Telephone company with his assistants had planned for this occasion, and brought with them to the convention a corp of operators especially trained for the occasion, consisting, in addition to Miss Cavanaugh, of the Misses Norris, Bowes, Collins and Spaulding. These young women were thoroughly drilled in fifteen sets of practice drills, consisting of recording, line operating, ticket work, etc.

The calls were handled from an originating telephone through three miniature switchboards, to terminating telephones loaned by the Automatic Electric company. The use of this equipment afforded an opportunity for the operators to handle in detail the many steps involved in handling the various classes of long distance calls both from the magneto and common battery office standpoint. Miss Cavanaugh supplemented the work of the operators at the switchboard by showing the proper ticket on large specially prepared tickets. In this manner those present obtained a more perfect understanding of the proper way to handle "station to station," "person to person," and "appointment and messenger," "evening" and "night" classes of business. Both single ticket method and two-ticket method were discussed, as were the subjects of report charges, overtime, call order and relay. The operators' school was considered very successful and Miss Cavanaugh and her assistants were complimented in the efficient manner it was conducted.

Among the manufacturers having displays at the convention were: The Chicago Telephone Supply company, Reliable Electric company, Kellogg Switchboard and Supply company, National Carbon company, French Battery Carbon company of Madison, Wis., and the Coffey System and Audit company. A number of other manufacturing interests were represented.

Lake Wawasee will long be remembered by those who attended this convention as being one of the most pleasant and profitable meetings ever attended. The telephone industry in Northern Indiana will be better because of it. Both manager and operator will have a clearer conception of their responsibilities and obligations to the public, the subscribers and their fellow employes.

TEN PAYLESS DAYS.

Litchfield, Ill., Employes Make Sacrifice to Restore City's Service.

Litchfield, Ill.—Then employees of the Litchfield telephone company, responding to a request of citizens, are working ten days without pay, restoring telephone service to the community.

Operators and others of the force went on a strike several weeks ago because the revenue of the company would not permit payment of the wages desired.

What will happen to the service at the end of the time is not known at this writing. Litchfield citizens are so happy at the action of the telephone company employees they are not worrying about the expiration of the ten days.

Bohn Explans Costs In Bill Enclosure.

Fort Wayne, Ind.—This city's telephone subscribers received with their July telephone bills an illuminating little pamphlet on "Telephone Costs," written by Frank E. Bohn, secretary and general manager of the Home Telephone and Telegraph company. Mr. Bohn explains in a concise and readable way the reason why rates must increase with population served, and makes his points reach home by comparing the situation in Fort Wayne with that in New Haven, Ind., which is served by the same company. The little circular is a vest-pocket classic in this sort of publicity.

Spring Grove, Minn., Forms Co-Op. Company.

Spring Grove, Minn.—The Village Co-Operative Telephone company has been formed with a capital of $10,000. Gerhard O. Roverud heads the board of directors.

EUROPEAN TELEPHONE PRACTICE

TRANSLATIONS FROM THE FOREIGN PRESS AND NEWS FROM EUROPEAN ENGINEERS

Equipment Demand Exceeds South African Supply.

Cape Town, South Africa.—The South African demand for telephone equipment is in excess of the supply. Although as much as £532,630 has been spent by the Union Government on developing the telephone service since the armistice, well over 2,500 long-standing applications for installations are still unfulfilled, and the government has not lost sight of its previous proposals for new automatic systems at Johannesburg, Cape Town, and Pietermaritzburg. Although much war-time depreciation has been made good, considerable repairs remain to be done, especially in the country areas, and each week sees heavy additions to the list of districts awaiting telephonic communication with the largest towns. In South Africa, too, the demand for equipment by private consumers, as apart from the government is on the increase, and last year the imports solely on this account amounted to approximately £30,800, as against only £17,475 in 1919. Add to this a reminder that on last year's official estimates an item of £600,000 appeared for telephonic improvement, additions, and renewals, and that at least a similar sum is expected from H. Burton's new estimates, and it will be seen that a market of more than ordinary importance is materializing.

Russian Invents New Wireless Phone.

London, Eng.—At a general meeting of the Russian Society of Road Engineers, says the Electrical Review, the engineer Ap. Phedoroff-Lukoyanof reported on his invention for telephoning any distance through railway telegraph wires. He calls his apparatus the "Simuraphon," and claims that it is adaptable to wireless telephony over unlimited distances with the aid of a special high-speed generator. He proposes the "substitution of the voltaic arc usually employed" and a special dynamo machine. The "Simuraphon" can, it is said, be connected to any telegraph station, and opens a way to new fields in radio-telephony.

French Experiment with 3750-Mile Line.

Paris, France.—Experiments will be made soon on the longest distance telephone yet installed in France. The authorities plan to telephone from Paris to the Moroccan seaport of Casablanca, a distance of about 3,750 miles. M. Laffont, Minister of Posts and Telegraphs, is conducting the experiments in person. If the experiment is a success, similar apparatus will be used for other long-distance telephone lines to link up Paris with various important centers in Europe.

Norway Making Intensive Telephone Study in Preparation.

New York City.—Prior to his return to Norway after a six weeks' study of telephone conditions in this country, Mr. Sigurd Indehus, maintenance engineer of the Bergen (Norway) Telephone Company, paid tribute to the American telephone's importance as a household appliance. He said Norwegian technical schools are introducing special courses in telephony to prepare young men for the great communication problems the country faces.

Foreign Telephones

EUROPE.

	—Telephones— 1918	1919	Population† Millions	Ratio of inhabitants to telephones
Austria	.....	114,075	9.5	83
Belgium	.....	38,000	7.5	198
Bulgaria	.....	4,378	5.5	1,256
Czecho-Slovakia	.....	54,000*	13.0	240
Denmark	219,460	238,000*	2.9	12
Esthonia	.....	1,896	0.48	253
Finland	.....	35,000*	3.0	86
France	367,898	399,519	41.5	104
Germany	.....	1,767,156	57.0	32
Great Britain	854,043	911,909	45.5	49
Greece	.....	2,000*	6.0	3,000
Hungary	.....	60,000*	12.0	200
Iceland	.....	2,033	(86,500)	43
Italy	.....	99,637	37.5	375
Jugo-Slavia	.....	.....	11.6	...
Luxemburg	4,627	5,190	(259,800)	50
Netherlands	134,507	142,000*	6.8	47
Norway	122,699	133,000	2.6	20
Poland	.....	36,169	13.0	361
Portugal	10,935	14,000	9.6	700
Roumania	.....	20,000*	17.0	850
Russia	.....	200,000*	?	...
Spain	.....	75,000*	20.0	266
Sweden	373,993	388,794	5.5	14
Switzerland	124,192	138,843	3.8	27
Turkey	5,820	6,078	?	...
		4,886,000	400.0	82

†The population figures are based on the latest censuses, the dates of which vary between 1910 and 1916. Those for France and the other states with altered boundaries are estimates for the years 1918 and 1919.

*Estimated. See foregoing notes.

ASIA.

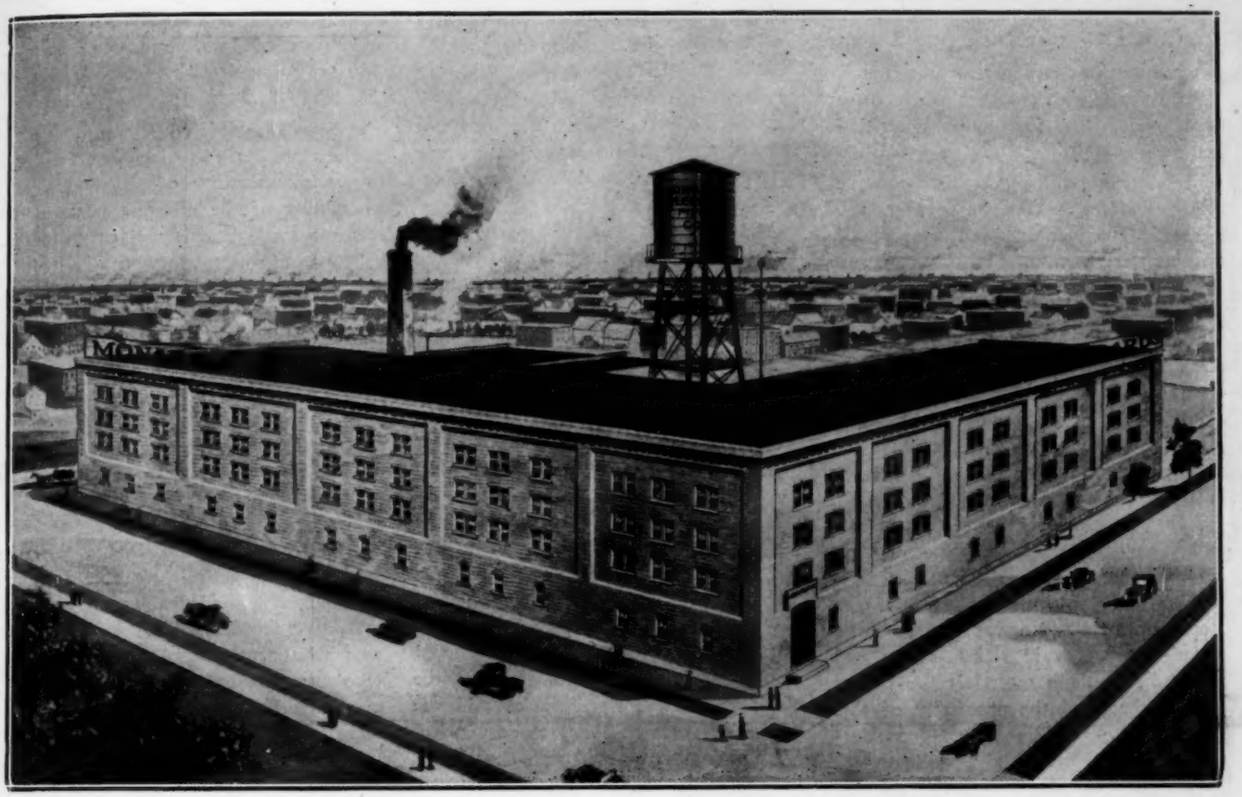
	—Telephones— 1918	1919
Japan	290,724	309,385
Chosen (Corea)	11,763	12,300*
Manchuria	6,558	7,000*
Formosa	6,757	7,300*
Sakhalin	819	900*
China (American est., 1914)	.....	27,000
Hong Kong	4,771	5,575
Philippines (Am. figures)	.....	7,000
Dutch East Indies	29,348	32,000
Singapore	2,801	2,916
Malacca and Penang	.....	1,339
French Indo-China	1,191	2,000*
India	26,492	30,022
Ceylon	3,011	3,100
Russia in Asia (1915)	.....	18,600
		466,000

(Population 910,000,000) *Estimated.

AFRICA.

	1918	1919
Egypt	20,689	20,827
Tunis	3,675	4,000
Abyssinia	.....	105
Gold Coast (1917)	.....	224
Senegal, Dahomey, French Guinea	.....	500*
Madagascar	.....	500*
Belgian Congo	.....	200*
Brit. East India & Uganda	.....	600*
South Rhodesia	.....	900*
Union of South Africa	38,396	42,419
		70,300

(Population 180,000,000) *Estimated.



New Home For The Monarch

Fort Dodge Independent Manufacturer Moves Into Big New Sunny Factory With Plenty of Modern Facilities to Allow Monarch Ideals Full Play

Fort Dodge, Ia.—The Monarch Telephone Manufacturing company has just completed removal to a large new modern daylight factory.

This new factory inaugurates a distinct epoch in the history of the company. A building of the most modern type, vastly increased floor space, improved lighting and ventilation, the addition of new devices and conveniences, make it possible for the Monarch to assure its customers new standards of service, the company claims.

The new factory is equipped with machinery of the latest and most approved type, two elevators for handling incoming and outgoing shipments and for carrying the raw materials and finished parts between the different floors.

Departments have been so arranged that ray materials entering the factory, proceed in an orderly manner through the various processes to the finished product with dispatch and a minimum amount of handling, insuring the highest efficiency and the production of standard equipment at lowest cost.

All walls and ceilings are painted white and with the bright daylight streaming through the large windows make the interior as light as day.

Three large fireproof vaults provide storage and protection for special tools, drawings, records, etc.

The new building has four floors which are equipped and arranged as follows:

The Ground Floor.

One section of the ground floor is devoted entirely to stock rooms containing piece parts and completed equipment parts such as transmitters, receivers, generators, etc., each individual piece part and each completed part is stored in its own individual compartment nad the amount carefully recorded in a card file. Each compartment is numbered so that any piece or part may be easily obtained when needed. In these stock rooms, such jobbing materials as house wire, batteries, porcelain knobs, tape,

staples, etc., are stored. Adjacent to these stock rooms is a large storage space for the heavier jobbing supplies. Between the stock and storage rooms is located the incoming freight unloading platform, which allows freight to be unloaded and brought in over weighing scales in order to check up the weights on all incoming shipments. Directly back of the scales is a freight elevator connecting this floor with the manufacturing floors above, insuring rapid transportation between the stock rooms and the machine and assembling rooms.

On this floor is another stock room used exclusively for finished switchboard parts.

In another section of this floor the heavy punch and stamping presses are located. The blanking and forming of many Monarch piece parts are made on these machines and as the dies and punches work on the very narrow margin of one one-thousandth of an inch, these presses are mounted on very heavy concrete foundations which entirely eliminate vibration and noise, and ample power is provided by large motors insuring perfect operation of the presses and a uniform product.

A tool stock room for dies, punches, and forming tools for these presses is located nearby.

Near the presses is located a large stock of steel, Norway iron, brass, nickel-silver, etc., in strips, sheets and rolls. From these materials the blanks are punched and the proximity of this stock to the machines affects considerable saving of time and handling.

On this floor is another department devoted to the finishing nad plating of the various metal parts as their use requires.

Outside the main building on a level with this floor is the boiler room, fuel supply and the heat treating furnaces. These rooms are built of fire proof construction and separated from the main building by fire doors.

In a large well ventilated room adjacent to the boiler room is located the air-blast gas furnaces, for heating the different iron and steel parts for tempering and annealing. O large power press is located in this room for forming such parts as have to be formed hot such as generator magnets, also the grinding machines, forges, tempering tanks, etc.

The First Floor.

In occupying the new building, we have provided commodious offices on the first floor in the south end of main building and the entire eas wing, all of which are exceptionally well lighted and ventilated.

From the door the visitor enters the general offices where are located the order clerks, accountants and general correspondents, also the files for the sales department and private branch exchange switchboard, opening into this office is a large fireproof vault containing the records of the accounting department and of all purchases made by Monarch customers. These records give very valuable assistance to our sales and engineering departments in furnishing proper parts and additions to apparatus furnished our customers in the past.

Adjoining the offices mentioned are the sales engineering and sales exhibit rooms, where the sales department is afforded a convenient place to properly entertain Monarch customers and visitors at the factory.

On the north part of the eas wing of the building on this floor are located the factory and cost accounting offices and the engineering department.

The factory offices are so located that easy access is had to all the different departments of the factory.

The engineering and drafting department is lighted from the north and east by large windows, a large fireproof vault is provided for this department wherein are stored all drawings, tracings and other engineering data carefully filed and indexed.

On the first floor of the main building the switchboard wiring and assembling department is located. An elevator at one end brings to this department the blank cabinets, formed cables and the assembled parts as they are required.

Adjoining the switchboard department is the packing and shipping department so arranged that switchboards may be brought to this department with the greatest ease.

All outgoing shipments pass over weighing scales, and weights recorded.

The Second Floor.

On the second fioor the main machine operating department for all metal work is located. This department is divided into five branhces, tool making room, drill-press, automatic and hand screw machine, milling machine, and steel frame departments, together with the inspection and counting rooms.

Skilled operatives have charge f our drill presses and each day thousands of holes are accuartely drilled in the different piece parts, each piece to be drilled is firmly clamped in an accurately made jig so arranged that the holes will be drilled in the exact location desired.

Automatic and hand screw machines which can be set up to the extreme accuracy one one-thousandth of an inch are used in turning all round parts, such as plugs, jack thimbles, etc.

The frames are assembled on this floor and when completed are delivered to the switchboard department on the floor below.

A tool stock room is located on this flcor in which are kept the hundreds of special tools for the machines on this floor, and after the run of the pieces, for which the tools are designed, has been made the tools are then stored in the vault on the ground floor.

Large stock racks are located in convenient places and hold the rods, bars and tubes of iron, brass, rubber, etc., that are worked up by the machines on this floor.

The Third Floor.

The third floor is given over entirely to the manufacture of telephones, and assembling of the different parts entering into switchboards and coil winding.

The entire east wing of this floor is occupied by the telephone department.

After the telephones are assembled they are given a careful test and final adjustment and then sent by an elevator to the packing and shipping room.

In the main wing of this floor are long benches where the different parts of the switchboards are assembled by girls and men especially fitted for this exacting work by long experience and careful training. Nearby is a large space devoted entirely to cable forming, here all hand made cables are laid out and laced in form. This work requires men who are experts in circuit work, who accurately and neatly form into one cable, hundreds of wires; each wire ending in its proper locations.

The winding department is located in this north end of this floor. Here small electric motors of special construction are operated by nimble fingered girls, winding the various coils needed in Monarch apparatus.

Adjacent to the winding department is a rest room, comfortably fitted for the girls and women employed in our factory.

Invents Watch to Promote Time Study Precision.

Chicago, Ill.—A new instrument of precision combining the advantages of the stop watch and the time study watch and which has in addition a split second feature is known as the "Split Second Time Study Watch." The agency for time and motion study watches and other "instruments of precision" formerly held by M. J. Silberberg has been taken over by Stein & Ellbogen Co., 31 North State street, Chicago. The Split Second Time Study Watch has a double hand and in addition to other features permits the taking two totally different operations at the same time ,or the taking of observations on two related operations.

FEDERAL AT MAJORITY.

Buffalo Independent Manufacturer Enters Twenty-first Year, Going Strong.

Buffalo, N. Y.—They are having a birthday party out at the big plant of the Federal Telephone and Telegraph company on Elmwood Ave. It's some party as befits a nine million dollar company, with a host of friends.

The Federal is a development of the Century Telephone Construction company, started by B. G. Hubbell and associates in Cleveland in 1900. The old Century company was started with $10,000 capital in cash, but with several million capital in ability, courage and optimism, according to gleanings from the birthday congratulatory messages.

D. G. Hubbell has been its president since the company's start. W. W. Kideney was factory manager when it began and he is now—B. L. Moore, one of the vice-presidents, and Hugh Taylor, assistant treasurer also were with the company at the very start. H. M. Dixon, secretary, has been in the business family for twenty years; G. H. Raymond, one of the vice-presidents, and Charles Duerr, purchasing agent, for nineteen years. Many others have been with the company for ten to fifteen years.

They are stickers in the Federal organization.

In 1902 the company moved from Cleveland to Buffalo. Things went along steadily until 1907. You may recall 1907 doesn't register in history as a particularly bright year for American industries. But it was at that time when the Federal organization whistled its way through the graveyard and emerged bigger by the purchase of the Williams-Abbott Electric Co. of Cleveland, which it moved to the big Buffalo factory it had erected that year.

Last year Federal bought the Corwin Electric Co. of Lafayette, Ind., and moved it to Buffalo.

Previous to the war the Federal company's manufacturing activities were engaged almost entirely in the east, where it furnished a large amount of apparatus to independent companies.

The Federal company built complete from the ground up many telephone exchanges, and some of the notable common battery switchboards in the country are the product of its factory endeavors. The company now occupies a very prominent place in radio manufacture.

During the war the Federal company operated for the government to capacity almost entirely on wireless apparatus and since that time an important part of its efforts have been in the production of radio (wireless) apparatus for amateur uses.

After the war the Federal company took up the foreign trade, believing that there was a broad field for its activities, and it has developed a complete line of apparatus entirely separate and distinct from its American line of apparatus, made to meet the demands of foreign governments.

This foreign apparatus, when shipped to foreign countries is made to comply with the foreign specifications of the British Association Standards.

The Federal company now enjoys a substantial business which is growing rapidly in all parts of the world in this special line of apparatus.

Its American trade for its American apparatus is rapidly growing in other districts than the east where its apparatus was largely used before the war.

Federal also has much business in the interior telephone field, resulting from the purchase and cultivation of the Corwin Electric company's proposition.

These telephone departments together with the radio apparatus which the company makes, places the company in the enviable position of having an exceedingly broad line of apparatus qualifying it to meet practically every telephone requirement from any part of the world.

Frankel Test Clip Business Hits Fast Pace.

New York City.—Indication of activity in the telephone industry is unmistakable in the Frankel Connector Co.'s factory. Business is reported A-1 by the well known test clip maker. The

Frankel's Dual Clip.

organization states there is especially good business in the Frankel Dual Clip. This clip is in favor because of its handiness and general adaptability. The Dual clip has a detachable hardened steel pin. This pin may be firmly attached in an instant, and supplies facilities for testing insulated wires. With the pin removed, the Dual is ready for use around binding posts, spark plugs, etc.

Sandusky, O., Merger Allowed by Commission.

Sandusky, Ohio.—The Ohio Bell Telephone Co. has been authorized by the Ohio Public Utilities Commission to buy the Sandusky Home Co.

RUNZEL-LENZ GROWS.

Cord Makers' Plant Enlarged as Landmark of Its Eighteenth Year.

Chicago, Ill.—The Runzel-Lenz Electric Mfg. Co., the largest exclusive makers of telephone cords in the United States enters its eighteenth year of business by expanding its factory facilities.

A new three-story brick and concrete building having more than 8,000 square feet of floor space now is added to the company's operating layout. Part of the space is devoted to the company's general offices and the rest given over to manufacturing equipment of the latest approved design.

Runzel-Lenz growth has been steady since the start. With the new plant addition, the space occupied by the concern now is more than twenty times that used by the organization at the beginning. There are many indications that more space soon will be needed to carry out plans for expansion which the cord makers have been compelled to make due to increased business. Under the capable management of W. L. Runzel, president, and J. M. Lenz, secretary, the company has prospered substantially. A new catalog, now in course of preparation, soon will be issued by Runzel-Lenz.

Perservance Pays Pignolet—New Company Formed.

After conducting his business for more than 25 years at one location, L. M. Pignolet has found it necessary to broaden the scope of his business to keep pace with the times. The Pignolet Instrument Co. has just been organized with W. F. Hessel as president, A. C. Hessel as treasurer and L. M. Pignolet as secretary. The Hessels are well known in the electrical business and Mr. Pignolet has won a place in the heart of the telephone men by his many years of service to the industry. Larger quarters have been secured at 114 Liberty street, New York City.

A Service Discontinued by Law in Denver's Early Days.

Denver, Colo.—Saw Howe, a veteran detective, in a recent interview on the telephone police work, recalled one of the valuable services rendered by telephone poles when trees were scarce in Denver. When some citizen erred flagrantly he was promptly suspended from the nearest telephone pole. This practice became so common the telephone company sought relief by a city ordinance prohibiting the use of its poles for the purpose.

TO SIMPLIFY TESTING.

Thompson-Levering Brings Out New Switch Dial Decade Set with Interesting Features.

Philadelphia, Pa. — Thompson-Levering company of this city has developed a new switch dial decade testing set which is said to represent the furthest achievement of this company's efforts to simplify telephone tests. Combined with the instrument's mechanical features is a comparatively low price, to make it a promising candidate for wide favor.

The preliminary announcement of the manufacturer states: "The operation of the instrument is so simple that anyone after a few minutes' reading of the card of directions may use it, and the results obtained are as accurate as those produced by any other commercial instrument of the Wheatstone Bridge type.

"All necessary mathematical calculations have been minimized so that it is one of the simplest instruments on the market to operate. It is an instrument which everyone who has any resistance measuring to do such as linemen, electrical contractors, commercial establishments where coils are wound, or any resistance to be measured, would find it equally useful.

"The instrument is of the Standard Wheatstone Bridge type, has in its rheostats four dials with coils of the value of merit, ten, hundred and thousand ohms, nine coils to each dial.

"The bridge is controlled by a single multiplying dial, and gives ranges of from .001 to 1,000 times the rheostat reading. The old method of using one fixed ratio arm and one moveable arm is not used but the bridge has a complete set of ratio coils, so calculated to give the correct ratios as the brushes are revolved. It is in reality a two-arm bridge operated by a single multiplying indicator.

"All of the contacts are made on the top of the set of the highest grade spring phosphor bronze brushes running over brass contact studs.

"Particular attention is called to the decided advantage of the rheostat arrangement. This instrument uses a resistance coil to each stud, making a full nine coils to each dial, and it is therefore impossible to make the rheostat useless by burning out the first coils. When a coil is burned out in an instrument using less than a coal to each stud, the set is absolutely useless until new coils have been obtained. It occasionally arises that a testing engineer will burn out a coil. With this instrument, made with a coil to each stud, the burnt-out coil may be short-circuited and the tester keep his set for measurements, allowing for the short-circuited coil, while he telegraphs or writes for a new coil of the proper value. This would be sent him adjusted to the required accuracy, equipped with tinned copper terminals, which he could replace personally without returning the set to us for correction. While this is a much more expensive construction, it is far superior to any method using less than full nine coil to the dial. A test set is only damaged when it is in practical use, and as it is at that time most badly needed to complete the test, therefore

this instrument is the safest for all testers to use.

"The resistance coils both of the bridge and the rheostat are wound with the highest grade of zero temperature co-efficient wire, and the accuracy of adjustment is 1-20 of 1 percent for the bridge and 1-10 of 1 percent for the rheostat.

"The galvanometer is of the D'Arsonval type, pivot and jewel system, of our latest and most improved design, and the distinct features which we have produced in these instruments is the very light moving coil element, combined with rugged construction and extremely high sensitivity. By making the moving system so light that the ordinary jars and knocks to which these instruments are subjected have no effect on it, we have eliminated the trouble formerly experienced in galvanometers, and our galvanometers will stand more rough usage than an ordinary voltmeter. This galvanometer is equipped with a 1-10th shunt, and it cannot be impressed too strongly upon the testing engineer or layman, who desires a test set, that such galvanometer protection is absolutely necessary. When used with the batteries in the set, a shunt is not ordinarily required, but where a higher E. M. F. is used an instrument without shunt protection is worthless. With such a shunt as part of the equipment the heart of the system (the galvanometer) is always protected from excessive currents which may arise by not knowing the exact conditions which may be encountered in any test.

"Battery renewals for this instrument are obtainable in any supply house."

GOTHAM W. E.'S HOME.

Largest Concrete Structure in Manhattan Has Many Unusual Features.

New York City.—The new building of the Western Electric company at 395 Hudson street, New York City, opened officially on July 15. It is not only the largest concrete edifice ever erected upon Manhattan Island, but it also has been said to be the most up-to-date warehouse, shop, office combination in the country. It is an 11-story building with a narrow five-story wing on Greenwich street.

The big edifice has a total floor space of 595,000 square feet.

By floors ,the features of the building are:

Tenth floor: A demonstration room where the latest developments in electrical household devices, farm lighting apparatus, and other modern equipment will be constantly on display, a conference room capable of seating an audience of more than 200, and an employes' restaurant which can serve 300 at one sitting.

Ninth floor: Offices of the New York and eastern district distributing house are located on the ninth floor. No desk is more than 20 feet from a window. An entirely new system of under-floor distribution for the signaling, telephone, power and lighting systems has been evolved by the company's engineers. It consists of a grid work of 4-inch fibre conduit split lengthways and reaching to every corner of the floor. It is possible to reach the lines of energy from any part of the ninth floor by simply cutting a small hole in the floor covering and providing a conduit extension from and through the wall of the nearest part of the under-floor system. The cost of connecting telephones, graphophones, etc., is thus reduced to a minimum.

Eighth floor and most of the seventh assigned to the shop departments, enable them to rival any industrial concern in New York City in efficient methods. Each machine has its own individual motor; the floor is divided into working bays with 20-foot centers. There are compressed air pipes and gas cocks for bunsen burners and the like emerging from the floor alongside of every work-

ing bench. An extensive shop store room for piece parts, tools, etc., a switchboard wiring department, a first aid section and several special rooms are also situated on the eighth floor. The latter have been especially prepared against the wearing effects of operations like those of baking, sandblasting, enameling and spraying. The walls, floor, and ceiling of the plating rooms are of vitrified clay to keep its acids within bounds.

The telephone switchboard of the building is located on its seventh floor. The Western Electric engineers plan to replace it with one of their new automatic exchanges early next year.

Warehouse sections of the building occupy its six lower stories, are a revelation. They include the biggest installation of stock storing racks ever made in this country.

One of the most interesting features of the new building is its conveyor system. Starting downward from the eighth floor and with outlets on the sixth, fifth, second and first stories is a great roller carrying device that enables the stockkeepers in the standard package and other departments to direct their wares directly to the wagons on the shipping floor without any outside interference. The chute is controlled by an electric button arrangement that works automatic deflectors permitting the men at the top of the shatf to shunt off a descending cargo at desired outlets. The rollers of the conveyor are of the one speed ball bearing type. They keep a 400-pound case of telephone hardware from making any faster headway than a one-pound carton of electric lamps.

The first floor boasts every possible convenience for freight handling. There are three powerful monorail cranes which can each lift from delivering truck loads of at least 6 tons, and carry them 40 feet into the warehouse. A special overhead conduit conveyor enables the storekeepers to stack the long pipe on their ends against the wall of the building in specially built racks.

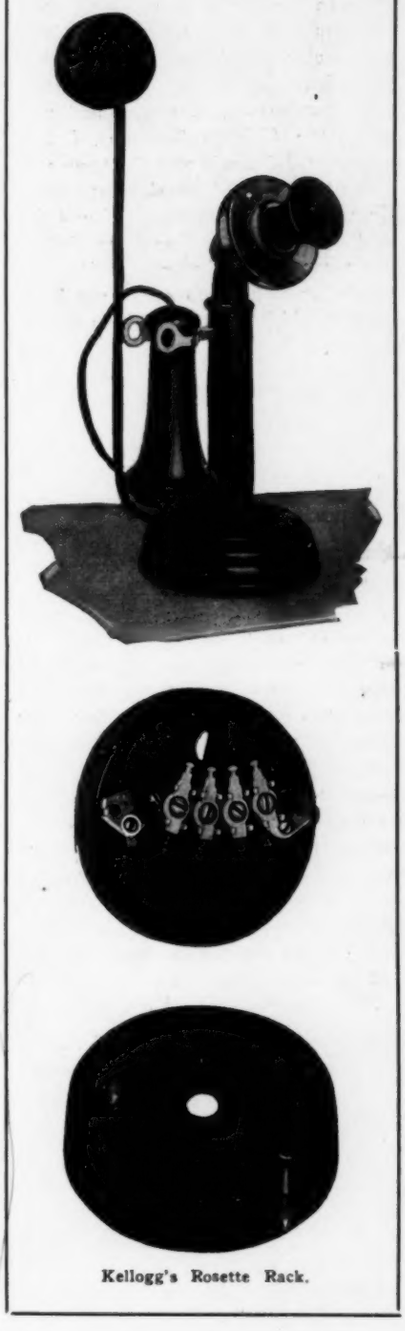
Fourteen trucks can be loaded at one time at the shipping platform while, at the same time, the receiving department is handling 12 others. If it should become necessary it will be possible to drive 10 automobile trucks into the garage which the New York Telephone company has leased in the west wing of the building and to load them direct from the warehouse floor.

Other features of the Western Electric's new home include the waste consuming system which carries odds and ends directly from each floor into the flames of a huge incinerator.

Kellogg Connecting Rack Invites Place in Spotlight.

Usually the connecting rack or bar for a desk telephone is hidden in some out-of-the-way corner under the desk or back of the water cooler because it is, or has not been a thing of beauty—hardly an ornament to the room or office, says the Kellogg Switchboard & Supply Co.

The Kellogg company has introduced a neat, compact metal box which harmonizes in finish and design with the desk set. It is an attractive fixture that will grace any room. This new attachment is called the Rosette type connecting rack.



Kellogg's Rosette Rack.

A brief description follows:

The base is of selected ebonized maple about three inches in diameter. The connecting rack itself is of Bakelite, insuring perfect insulation. The strong steel cover is formed in one punching operation in such a way as to give it unusual strength. It is enameled and is given a dull luster finish to match the desk set. There are two fastening screws mounted right in the cover to prevent their slipping out and loss when the cover is removed.

Telephone men will see from the accompanying illustrations that here is an attractive and easy way of putting up desk stand installations. It cheapens the cost of installing a new phone, and does away with the need of soldering iron in closing or opening circuits, say its sponsors.

30,000 SUBSCRIBE.

New Stock Issue of A. T. & T. Taken to Extent of $22,500,000.

New York City.—Stockholders of the American Telephone & Telegraph company have received the following notice:

"The allowance of 6 percent interest on advance payments received as of June 6 and June 20, upon subscriptions due July 20, 1921, for this company's new stock issue has met with the approval of stockholders, as evidenced by subscriptions to over $22,500,000 already received from more than 30,000 stockholders.

"It has also brought out a general request that another prepayment date, on which interest should be allowed, should be added between June 20 and the due date of July 20. Arrangements have, therefore, been made to allow interest at the rate of 6 percent per annum on payments due July 20, 1921, received after June 20 and before July 7, 1921."

Banking Institution Formed by Telephone Employes.

Concord, N. H.—Telephone workers of New Hampshire have formed a Credit Union similar to the "group banks" operating in Massachusetts. The New Hampshire company starts with 60 members but hopes to have practically all of the 1,500 telephone company employes of the state enrolled soon. The board of directors elected the following officials: H. B. McKeon, president; E. F. Newton, Concord, vice president; Alfred White, Plymouth, 2d vice president; Ruth M. Doherty, Manchester, 3d vice president, and W. J. McLaughlin, treasurer.

AUTOMATIC'S SOLUTION.

Vivian Tells Indiana Convention Automatic Answer to the Operator Problem.

Lake Wawassee, Ind.—W. S. Vivian, of the Automatic Electric company, who was invited to tell the Northern Indiana Telephone association "Why the Automatic Will Solve the Operator Problem," said in part:

"There are three distinct types of equipment on the market: automatic, semi-automatic and manual. Each is radically different from the others. Each manufacturer presumably believes his equipment to be better in certain particulars to that of any other make of equipment. Each make of equipment has its users and its friends. Therefore, it is important from every standpoint that I do not over-rate the possibilities and advantages of automatic equipment and naturally I do not desire to underrate them, although of the two possibilities I would rather underrate. My desire is to treat the subject in a manner that will be fair and impartial and to allow suitable opportunity for others to participate in a discussion, should they so desire.

If there is an operator problem—and there apparently is—else this subject would not have been assigned—there are three things which the operating company can do.

First: They can continue with the problem as it now is. There may be companies operating in certain communities where conditions are such that it is not considered either for the present or the future as serious or important.

Second: They can reduce the problem by means of installing improved equipment which will require a lesser number of operators.

Third: They can eliminate the problem by installing automatic.

"It is interesting to note that the first Automatic telephone exchange in the world was installed in Indiana, at La Porte, in 1892. This exchange was more or less crude in that each telephone had five push buttons and five wires going to the telephone office. To make a call a subscriber manipulated these buttons and then by means of a hand generator rang the called subscriber's bell. That was the beginning but from that day to this, because of its secrecy, accuracy nad availability, there has been a constantly increasing demand for automatic telephone service.

Has Weathered Storm.

"Automatic telephony has weathered the storms of trial and is now before the world as an established fact. We are living in the days when science is applied to make the work of men and women easier.

"The automatic telephone is quick—it is secret, sure and simple. A child can operate it with ease and blind people use it every day. It is always available night or day, every minute of the twenty-four hours. It is as quick at 3 a. m. as at 3 p. m., when oftentimes seconds mean life or death.

"When there is an epidemic, in manually operated systems, many operators are home sick; the result of which is the material slowing up of service with the resulting inconvenience and loss to the telephone using public. The automatic telephone, however, continues to give the same quick, uniform service.

"When there is a strike of telephone operators such as there was in Christian, Shelby and Montgomery counties, Ill., duirng the summer of 1919, telephone service was suspended and as a result, the Chicago Tribune of September 19, 1919, said that the town residents affected had learned "that modern life without the telephone, if not impossible, is disastrous" and the Tribune then recorded six disastrous incidents of the strike: Five deaths and one heavy fire loss which might have been averted except for the telephone strike. If the automatic telephone had been in use, service would have gone on without interruption. With automatic, labor troubles are reduced to a minimum.

"The real test of telephone service is not what it can do under the best possible circumstances but under the worst. Traffic varies greatly from hour to hour throughout the day. At one time the volume of calls is so great that in manual exchanges it overtaxes the ability of the maximum number of girls who can work at a switchboard. At another time the calls may hardly be sufficient to keep two or three operators awake. The automatic is built on a different plan. It must of necessity always be ready to serve the city's maximum traffic. It cannot help but operate with the same speed and accuracy in the dead of night as at midday. Machines do not go to sleep. It does not matter to them whether ten calls or ten thousands calls are made in an hour.

"When the switchboard operators are tired or when the calls come with a rush they cannot give accurate service, whereas steel switches are never tired or never confused. They always work at lightning speed. They are always on the job every minute day or night, winter or summer.

"All human agencies are liable to err which has led to the coinage of the phrase, "To err is human, to forgive divine." In spite of the efforts of the operators to give the best possible service, so great are the human frailties that mistakes will happen, connections are made with lines already busy; in fact, a thousand and one things are possible and the result on very frequent occasions has been a loss of temper with the resultant complaints, misunderstandings and expense to the company. With automatic, the telephone user makes all connections. An automatic user once said, "To avoid error is automatic." The opportunity for errors are reduced to a minimum and the error, if error there be, has its esponsibility in the use and not the exchange.

"The operator has been and is a very important part of the telephone business Instances of her ability, loyalty and courage are legion. In time of fire, flood or other emergency, she has not been found wanting. Never has she been so fully appreciated or so high a value placed on her service, as at the present time. But, because a machine made of iron and steel can operate more accurately, rapidly and continuously, and can carry a heavier load more easily, and economically than can the operator made of flesh and blood, whom we wouldn't have any different if we could, are reasons 'Why the Automatic will Solve the Operator Problem.' "

Signal Corps Commissions for Telephone Men.

Washington, D. C.—Commanding officers of the nearest military posts of Chief Signal Officer of the Army, Washington, D. C., will supply particulars of August examinations to candidates for commissions as second lieutenants in the Signal Corps. Telephone men are especially wanted for these vacancies.

Power Company Constructing $60,000 Private Line.

Keokuk, Iowa.—A private telephone line extending from Kincaid, Ill., to Keokuk, is being built by the Central Illinois Public Service company. The cost is estimated at $60,000.

Citizens of Grand Rapids Marketing Bonds.

Grand Rapids, Mich.—The Citizens' Telephone company is to market $300,000 7 per cent bonds to mature in 1926, to finance growth of the past five years and construction now in progress and scheduled for the future. These bonds are part of the $3,000,000 authorized, of which $945,000 are outstanding. The issue represents an increased return of 2 per cent over the initial issue. The offering is made direct to investors with holders of the company's securities being given preference. The Citizens' has added 3,377 subscribers during the past year. It now has 42,309 patrons.

Bird Nest Rent—A Dollar Up

Telephone Company in Role of Landlord for Birds is Bright Idea of Ornithologists Who Suggest Compensation for Bird Destruction

By F. J. Koch

The chances are that before so very many years folk who own property edged with trees, property on that side of the residential avenue which is also flanked by the poles of the telephone companies, may be called upon to pay for birds' nests. This, or else stand by and watch the destruction of the nests.

One nest, two nests, a dozen nests, mean nothing, viewed from the standpoint of a great telephone corporation; but multiply a dollar, often a dollar and a half, by the number of nests birds build in trees adjacent to the telephone wires in any big American commonwealth, and you will begin to find that since bird protection has done so much to populate the suburbs with birds, some steps for self-protection are decidedly well worth a phone company's while!

Why should this be so?

Watch the birds at work on the first nest you may find in the trees bordering some suburban sidewalk. They fly about, returning with their trove, and place it into their home. They mark the wire traveling through the branches of the tree here, within easy reach. They note a wee bit of black insulation, chafed free by rubbing in some storm, hanging, as a shred. Here, indeed, is a prize, a something for the nest; they peck at it and tug at it with their bills. It tears. Seizing the one piece and stowing it in the nest bed, the bird proceeds to tear away more, then more. Easy feathering for the nest here—easier far than flying in each of down. The bird will not remain content until it has brought down a lining for the entire nest!

And then it happens:

The breezes blow and then sweep the limbs, escaping the telephone company's pruning squad when last it came, the length of the wires. The limbs brush past the naked point; they brush against the edges of what insulation remains; they tear more of this along.

It doesn't take an expert in the science of telephony to know what will occur.

In Cincinnati, at least, where the Audubon Society has done much to encourage wild birds to suburban trees, there is an inexible rule on the point. Attendants coming upon a "bare spot," whatsoever the cause of it, may not stay content with wrapping this with an insulating tape, or other of the simple insulations sometimes used to such ends; but a new section of wire, insulated as is all the rest, must be inserted at once. The investigators make a careful notation of the site; then report their find to those in charge of work on the wires;

Handy Shreds of Insulation Make This Nest Cozy.

these repair to the spot; cut out the sections spoiled, and put a new strip of the telephone wiring in its place.

It is well enough to say that such wire, bought in the quantities a big, urban telephone company will employ, is rather cheap; that employes are paid by the week anyhow. Concerns of the sort now take up every item for attention from the standpoint of costs, and, measured by this, the Cincinnati engineers state it costs anywhere from a dollar to a dollar and a half to spare the average nest built along the company's wires.

In addition to the actual cost of the material used in the repair and the trouble given these employes, there must be considered the interruptions to service over the given wires.

Only wires along suburban streets serve the interests of suburbanites largely, obviously, and suburbanites—company patrons there—do love birds. They love the wild birds so well, they are so eager to attract and keep them, that many families have offered to pay the telephone companies a flat sum—a dollar, two dollars—a year, as surety against any damage from the tenants of the nests in their trees.

What is more, bird-lovers remind the companies that there is always some salvage on the mutilated wire, to reduce that estimated loss.

They recall, too, that birds, even in their increased numbers, are not doing nearly the mischief to the service which their predecessors did, not so many decades ago.

It is within the easy memory of all, of course, when the larger city telephone services employed the wooden "tunnels" at such points as had cables emerging from the ground. Poles at these places had wooden terminals, and these adapted themselves peculiarly to the needs of the nest-builders, who would slip in from below; erect their homes, and then wreak what vengeance they cared upon all telephone property about.

Later the wooden terminals of those halcyon times were replaced by metal devices. It wasn't nearly so easy for a bird to slip in, underneath there; it was next to impossible for a bird to find supports for his nest, and so the birds dropped the fashion of tenanting the tunnels, and have gone to other parts for their homesites.

The causus belli between the telephone builder and the wild bird, lured to the city suburbs, has, therefore, been minimized in infinite degrees, those who would save the wilds say.

Now, these bird-lovers are advancing other hints to save the birds from the vengeance of those called to protect aerial rights-of-way.

One of these suggestions is a city ordinance requiring the linemen to notify abutting property owners of the presense of a bird's nest whose occupants are damaging the wires. Such property owners may evict the birds, or they may elect to pay a maximum penalty for damage, should such be done beyond the point of mischief which the men have already come to repair. Better still, the bird-lovers may elect to guard against any further depredations by those birds; at the same time leaving them safe.

Idle Circuits Greedy

By W. H. Barnes

"The everlasting teamwork of every blooming soul" is needed to keep idle long distance circuits from gnawing a gap into profits according to W. H. Barnes, A. T. & T. company district plant superintendent.

Mr. Barnes presented his ideas on the necessity of keeping circuits busy in an address at Birmingham, Ala., before Southern Bell employes. Mr. Barnes said:

"The Bell System represents more than a billion dollars capital. That is so much money I doubt if a person could count it in dollar bills in a lifetime of 80 years at 30 per minute. All the pole holes represent an excavation that makes the Panama Canal look like a small ditch. The wire in the transcontinental circuits, New York to San Francisco, is about 3 million pounds. Made into one circuit to Montgomery, 100 miles, it would make two wires about the size of a tree. The money it cost to build this one circuit made into a gold wire would possibly give you a S. H. circuit to Montgomery. The rate from New York to San Francisco is about $20 for three minutes.

Interest Terrific.

"If you take the time it takes to put up a call and find out the interest on this money for three minutes you will find that the charges are not much more than 8 percent. If you hold the circuit for an hour and only get through one call the company has lost money. This is true of all circuits. The company has to pay interest on the money while the circuits are idle—at night and on Sunday—and all of your time when you are not busy. If we had business for all our circuits all the time, 24 hours per day, we could afford cheaper rates. All the time circuits are idle by O. D. or slow operating and other misuses the cost of that circuit is eating up money. The public is getting impatient.

"We have no way to tell how much business we lose from the following sources:

"People who have had a raw deal and quit using long distance, or limit their use.

"People who get tired waiting and cancel their calls.

"People who cancel their calls after the time has passed and it would do them no good.

"People who think the mail or telegraph is as quick as the telephone and people who do not know the value of telephone service.

"Now there is something we can all do to save as much of this lost business as possible. The operators should consider all calls as important. People do not pay from one to twenty dollars to talk there minutes unless it is urgent. The shorter the call the more likely we are to lose it because we have competition in the quick mail and telegraph. The largest revenue is from short haul calls.

"We will soon have eight or nine-hour aeroplane service to Chicago, so people will not wait one and two hours on a long distance call. Our salvation is going to rest more and more on quick and prompt service.

"The plant department can save lost business by their promptness in clearing the circuits in trouble. Operators should always see that a lineman gets communication with the testboard immediately.

Every Call Important.

"The plant department might furnish the most perfect lines in the world, and we do—but unless the operating department furnish the best and most efficient service over these lines, we receive criticisms. Both departments must co-operate—work together. The plant department goes through all the hardships of keeping the circuits in order and we would be very much discouraged if we heard operators were not making the best use of them—and I want to tell you the plant department is interested in knowing what you operators are doing with these circuits. Why? First, we are interested in our company's success. Second, if the operators don't get the business through we know times are going to be hard and we begin to worry to know if there is going to be enough to pay off with Saturday. The plant department cannot be a slacker on the job—whenever line fails everybody knows about it. The operator hollers, the testboard hollers and there is no way for us to say, Oh, well, I'll pass this up. No, we have got to get out night or day and get this trouble. We pride ourselves, too, on the records we make.

"Now, in all fairness, I wonder if every long distance operator looks at every call in the same light that we do every case of trouble. Do you make the same hard fight to save that call and please the party that we do to get a case of trouble and please the operating department? I believe you do."

Contoocock Valley Company Changes Hands.

Concord. N. H.—Philip C. Lockwood has purchased the Contoocook Valley Telephone company which operates in Hillsborough, Antrim, Deering, Bennington and Henniker, from George W. Lincoln. Mr. Lockwood also has bought the Henniker Telephone company. These properties will be under the management of Mr. Lockwood and L. M. Barton of Concord.

Favors Family Men on Line Building Payroll.

Astoria, Ore.—Construction of the new telephone line between this city and Portland is now under way. Employment preference is being given to local men with families as the utility's aid in solving the local unemployment problem.

"Gives Southern Bell Increase," Phone Hungry Cry.

Raleigh, N. C.—Would-be Southern Bell subscribers are making the corporation commission mailman stoop-shouldered with letters requesting grant of a rate that will allow the Southern Bell Telephone company to make extensions and improvements, according to North Carolina capitol scribes. The volume of this correspondence is not without its effect upon the commissioners, it is stated.

Lincoln, Ill., Installing New Headquarters Outfit.

Lincoln, Ill.—This city has high expectations from the new central office now being installed. The new equipment will be completely in operation in the near future.

Portland, Ore., to Hear Loud Speaking Telephone.

Portland, Ore.—As one of the big features of Portland's annual Rose Festival, the Pacific Telephone & Telegraph Co. is installing sound amplifying apparatus similar to that used at President Harding's inauguration. The state is being plastered with newspaper publicity headlining the apparatus as a drawing attraction of the big event.

President Harding Gets Desk as Bell Inaugural Gift.

Washington, D. C.—The desk beside which President Harding stood at his inaugural, and addressed the largest number of people spoken to at one time in the world's history, is to be presented to the President by the A. T. & T. Co.

MACHINE SWITCHING TELEPHONE SYSTEMS

For Public or Private Exchanges

THE AUTOMANUAL SYSTEM—An automatic system without dials, in which a few operators control the switching machines of a large exchange.

THE AUTOMANUAL SATELLITE—In which the machine switches in distant villages are controlled from AUTOMANUAL keyboards at a city exchange.

THE DIAL AUTOMATIC SYSTEM—In which the machine switches are controlled by dials at the subscribers' stations.

THE ALL-RELAY SYSTEM—In which there are relays only, with no moving selectors; adapted for dial or keyboard control.

A NEW AUTOMATIC DIAL—The latest North product.

THE NORTH ELECTRIC MANUFACTURING COMPANY

GALION :: :: OHIO

Telephone Wire

Ask your Lineman, **"the man who knows,"** the kind of wire best adapted for perpetual, satisfactory service. He will say

Muncie Wire

if he has ever seen, tried and tested it.

Before purchasing your next supply get our samples; test and compare, we may save you a costly mistake.
Muncie Wire is handled by most representative Jobbers and Supply Houses.

INDIANA STEEL & WIRE COMPANY
MUNCIE, - INDIANA

Back toward the Good Old Days!

COLUMBIA

Gray Label Dry Cells

Reduced in Price

June 1st brought the welcome news that all standard types of Columbia Dry Cells and Unit Batteries have been reduced substantially in price.

This means that the same high quality coupled with the new low price brings you still

Less Cost Per Day of Service

NATIONAL CARBON COMPANY
Incorporated
Cleveland, Ohio **San Francisco, Calif.**

CANADIAN NATIONAL CARBON CO., Ltd.
Toronto, Ontario

Switchboard Gives the Movies a Bright Idea.

Chicago, Ill.—A large sale of switchboard lamps and lamp jacks has been made by the Kellogg Switchboard & Supply Co. to an enterprising company which uses them in locating empty seats in darkened theaters. A strip of lamps is located on the lower part of the end seat in each row. Number and location of vacant seats in the row is indicated by the lights that are illuminated.

Ill. Companies Apply for Commission O. K. on Union.

Jacksonville, Ill.—Following an agreement made about three months ago, the Illinois Telephone company and the Illinois Bell Telephone company have applied to the state utilities commission for authority under which the first named company may buy the property of the latter in Jacksonville, Alexander, Literberry, Carrollton, Roodhoues and White Hall.

Bloomfield Approaches Last Round of Battle.

Bloomfield, Neb.—On April Fool's Day patrons of the Union Telephone company went on a strike as a demonstration against a rate raise. Since that time there has been no telephone service in Bloomfield. On June 30 the exchange closed on order of the state railway commission, having, it is said, only about 30 subscribers at the close. Now reports say, local men are trying to buy the plant and hesume operating.

Portland, Ore., Spending Big on Change.

Portland, Ore.—Some of the expense entailed by the adoption of automatic methods by the Pacific Telephone & Telegraph company in Portland, have been given as follows: Call indicator equipment, $300,000; Broadway switchboards, $90,000; automatic central office equipment, $175,000; new Irvington office, $1,200,000. More than $3,000,000 is involved in the complete campaign.

Bell Busy Building in Philadelphia.

Philadelphia, Pa.—Almost $250,000 is being spent here by the Bell Telephone company to complete its building program. Half a million feet of cable is being put in service. By the end of 1921, 119 more operators will be on the payroll.

Carolina Island Makes Plea for Telephone System.

Charleston, S. C.—The Edisto Island Agricultural Society, of which J. G. Murray is president, seeks to inaugurate telephone service on the island inhabited by its members.

Hit by Change of Permanent Highway Route.

Charlotte, N. C.—Trouble and expense looms for the Bell Telephone Co. in Mecklenburg county due to a proposed change in the route of permanent highways. Emphatic protests have been made against the change by the telephone company and many citizens.

Bell Biggest User of Office Space in Columbus, O.

Columbus, Ohio.—The Ohio Bell Telephone company occupies 25 floors in six office buildings in Columbus, a total of 146,000 square feet of space. Local reports say the contemplated Bell building will be the largest in the city.

California Property Has New Owners.

Sierra Madre, Calif.—O. E. Emley, Walter Dunn and J. M. Baldwin of Monrovia, have bought the local telephone company from W. E. Farman and associates.

Guymon, Okla., Company Spends $10,000 Sprucing Up.

Guymon, Okla.—The Guymon and Hansford Telephone company is spending $10,000 in the installation of a new switchboard and in underground cable work.

Spain Investigating Sweden's Telephone Facilities.

Barcelona, Spain.—The Spanish government is visiting Stockholm to investigate and report on the Swedish telephone system and Sweden's telephone manufacturing capacity. It is said the Spanish government may enlist the assistance of the Swedish telephone concerns, Messrs. L. M. Ericsson and H. T. Cedergren, for rebuilding and reorganization of the Spanish telephone system.

Telephone Booths English Advertising Mediums.

London, Eng.—Walls of government public telephone booths are to be covered with advertisements. All the advertising is to be subject to the approval of the Postmaster-General.

Government Prints Record of Phone Operation.

Washington, D. C.—Government operation and control of telephone, telegraph and marine cable service from Aug. 1 1918, to July 31, 1919, is the subject of a hundred page booklet recently issued by the U. S. Postoffice Department. Copies may be obtained from the Government Printing Office.

Claim Pole's Location Worth $35,000 to Garage.

Fort Wayne, Ind.—Vetter Brothers garage, claiming that their $35,000 building would be worthless as a garage if a telephone pole were placed at the entrance, according to the utility's plans, have been granted a restraining order by local courts.

England-Holland Phone Cable in Prospect.

Plans have been made for laying a telephone cable between England and Holland in the near future.

Standard
Rubber Insulated Telephone Wires
Include a wide variety of high grade products, among which are:
Plain Terminal or Pothead Wire.
Glazed Braided Switchboard Wire.
Flameproof Braided Switchboard Wire.
Weatherproof Bridle and Drop Wire.
For further information write for Bulletin 500.
Standard Underground Cable Company
Pittsburgh, Pennsylvania
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STANDARD UNDERGROUND CABLE CO. TRADE MARK

Telephone Construction is making up for the war time lay-off
Get orders from the busy builders by advertising in
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Write for rates on advertising